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AMERICAN ANTIQUITY

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A CORN CACHE FROM WESTERN COLORADO

C. T. HURST AND EDGAR ANDERSON

INTRODUCTION

FOR the past nine years the Museum of Archaeology of the Western State College of Colorado, at Gunnison, has been engaged in archaeological excavations in central and western Montrose County. This county adjoins the Utah line and lies in the northwest part of the southwest quarter of the state of Colorado.

Six sites have been excavated during the course of this work. The following is a brief summary of the excavations, presented as a background for discussion of a corn cache found in one of the sites during the summer of 1947.

THE MONTROSE COUNTY AREA IN GENERAL

Five of the excavated sites are located in canyons, or on the mesa at the base of the southwestern slope of the Uncompahgre Plateau. One site is in the canyon of the Dolores River below the confluence of this stream with the San Miguel River.

Work was carried on during the first half of August in each of the nine years from 1939 to 1947, inclusive. These were short periods of time, but by intensive operations, field parties varying from eight to twelve individuals accomplished results out of proportion to the shortness of the sessions.

For three years (1939–41 inclusive) work was carried on in Tabeguache Cave located on the south side of Tabeguache Creek about ten miles northeast of the town of Nucla. Tabeguache Creek flows due west and empties into the San Miguel River.

Tabeguache Cave (Hurst, 1940, 1941, 1942) revealed a peripheral Basket Maker II culture. Hundreds of artifacts were recovered, most of them checking in type with those of the classic area of the San Juan. As would be expected in a peripheral site, some of the artifacts were atypical. Among the items were the remains of corn—shelled corn, husks, stems, whole ears, and cobs. Cobs were present in large numbers. This corn would be what would be expected in such a cave.

Tabeguache Cave II, excavated in 1942–44 inclusive, told a far different story (Hurst, 1943, 1944, 1945). The upper layers of the deposits contained material left behind by the late nomads of the area, presumably the Utes and their ancestors. Below these layers were others which revealed a relatively small number of Basket Maker artifacts intermingled with those of contemporary nomads. It would appear from these circumstances that the Basket Maker objects were the result of trade or conquest, and that the cave had not been occupied by the Basket Maker people. Corn occurred only sparingly in this cave.

The bottommost deposits in Tabeguache Cave II showed evidence of a very early pre-Basket Maker people. Some of the traits in this level were interpreted to be ancestral to certain Basket Maker ones.

In 1945, Tabeguache Pueblo, located approximately four miles north of Tabeguache Cave II and on the mesa, was partially uncovered. Three of the four houses of this pueblo were explored, one of them completely (Hurst, 1946). The artifacts recovered related the site definitely to the peripheral Pueblo I–II period. Among these artifacts, no trace of vegetable food was found but grinders of the deep bowl type indicated the use of corn.

The third cave excavated by us is known as Dolores Cave and was worked in 1946. It lies under the rimrock on the west side of the Dolores River Canyon immediately opposite the spectacular formation known as "Lone Dome." Our work indicated this cave to possess deposits ranging from Basket Maker times to early modern times (Hurst, 1947). No trace was found of pre-Basket Maker material or that of the late nomads. Except for some items,

Dolores Cave was quite different from the other two caves. Again, but a small amount of corn remains was encountered.

The season of 1947 was spent in operations at two sites, a pueblo and a cave—the former known as Cottonwood Pueblo and the latter as Cottonwood Cave, the latter being the site that yielded the corn cache. Cottonwood Pueblo is located on the edge of the mesa on the north side of the Cottonwood Creek Canyon, immediately opposite the Hill Ranch and but a few hundred yards distant by stiff climb. The cave was located on the west side of the north fork of Cottonwood Creek, some three miles from Hill Ranch.

We proceeded simultaneously with excavations at both these sites (Hurst, 1948). The camp for all personnel was located at the Hill Ranch, and this made necessary a serious loss of time on the part of the individuals who worked in the cave, but in spite of this handicap considerable digging was accomplished.

Like the Tabeguache Pueblo, Cottonwood Pueblo proved to be a peripheral Pueblo I-II site. One of the four houses was completely dug out. Most of the artifacts at the two places were identical, but some were different—especially the corn grinders and the corrugated pottery, which varied in minor details. In addition to deep bowls, medium-deep and shallow to flat ones also were obtained in considerable number at Cottonwood Pueblo. As would be expected in an exposed site, no corn was found. The two pueblos are approximately fifteen miles apart.

Cottonwood Cave yielded in quantity only Basket Maker materials, with some possible Puebloid influence. No contemporary or late nomadic items were uncovered. Considering the amount of excavating that was done in this cave, a good quantity of corn was recovered. Among the corn specimens was the very unique cache bundle described below.

In a sub-Basket Maker location in Cottonwood Cave was encountered an example of the same pre-Basket Maker type of projectile point found in Tabeguache Cave II. This leads us to believe that further work in this cave, in 1948 or subsequently, may possibly add more details to our knowledge of this early culture.

Taken as a whole, the six excavated sites indicate a culture sequence in western Colorado from pre-Basket Maker times (Basket Maker I?) to the time of the modern Ute, who were in the area when the white man arrived. The only missing element is the pithouse culture (Basket Maker III). It is entirely possible that the pithouse may not occur in this part of Colorado. Up to now, we have been unable to find any of these structures.

Another possibility is that the Basket Maker III level may be represented by an entirely different complex than is characteristic elsewhere and that we have not yet recognized it—or it may have failed entirely to make its appearance as a differentiated culture.

Several possibilities with regard to relationships of peoples may be considered. If influence was from the outside, which it could easily have been, the people who used the caves may have made a more abrupt transition to house building than was the case to the south. On the other hand, they may have been different peoples, and the later comers may have driven their more primitive predecessors out. Finally, it is possible that the pithouse transition exists in the area and only awaits being located and recognized.

One thing is certain, and that is that the Basket Maker and Pueblo cultures in central and western Montrose County are heterogeneous and do not possess any very close unity. This is less true of the pueblos than of the caves. The latter have varied widely. Even though all six of these sites are relatively close together they give strong evidence of having been used by isolated groups of people with their own local developments superimposed on the general pattern.

THE CORN CACHE

Cottonwood Cave was the site which yielded the corn cache.[1] The front end of the main trench in this cave was carried to a depth of thirteen feet with hardpan or bedrock not revealed. Thick to sparse layers of charcoal were encountered beneath the Basket Maker layers, which latter extended from the surface downward for a maximum of thirty inches.

The diagram of Cottonwood Cave (Fig. 30) was made by direct measurements from a base line. The main trench sunk through the deposits at the left end of the cave is indicated on the plan. This trench varied from a few inches

[1] The excavation of this site was supported in part by a grant from the American Philosophical Society, Philadelphia, for which acknowledgment is gratefully given.

in depth near the back wall of the cave to thirteen feet at its outer end. Further excavations, by stripping, were carried out laterally from the trench. A small cist was uncovered in one wall of the trench. The most noteworthy artifact to be taken from the cave was the juniper bark cache bundle (Fig. 31). This bundle, sixteen inches long and eight inches in diameter, is made of nicely laid strips of juniper bark and tied with split yucca leaf. Its resting place is shown on the floor plan (Fig. 30).

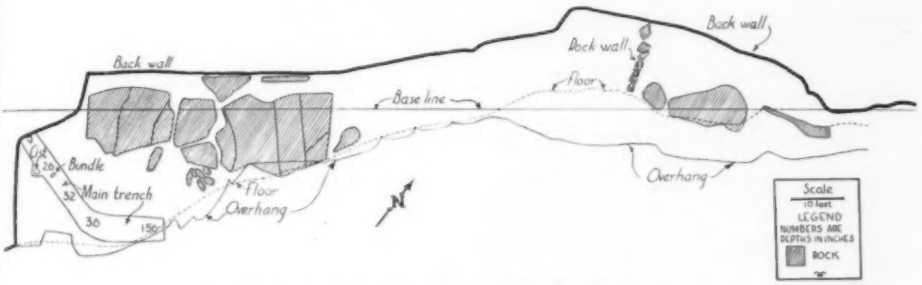

FIG. 30. Plan of Cottonwood Cave, showing the 1947 excavations.

FIG. 31. Cache bundle from Cottonwood Cave.

The circumstances of burial of this bundle are an indication that it belonged to the latter part of the Basket Maker period of use of the cave. It was found thirty inches below the surface in a pit that had been filled in with sterile soil and disturbed particles of trash. The pit had been dug through six inches of trash of earlier date (Fig. 32). Overlying this was a large flat rock. Above the rock were three inches of undisturbed trash continuous with the rest of the upper part of the cave trash.

Upon study by X-ray photography, the bundle was found to be filled with shelled and unshelled ears. In a way this was a disappointment, as we had thought it possible that an infant mummy might have been included. However, when the bundle was opened and its contents removed, the superior quality of the corn was immediately recognized and we felt more than rewarded.

The bundle yielded the better part of a gallon of shelled corn and fourteen unshelled ears (Fig. 33). There is little doubt that it was not a food cache, as cists were ordinarily used for this kind of storage. Possibly, as indicated by the selected character of the corn, the bundle was a cache of seed corn or it may have been a ceremonial offering.

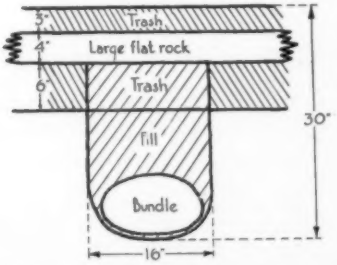

FIG. 32. Location of cache bundle from Cottonwood Cave.

FIG. 33. Corn from the cache bundle, Cottonwood Cave.

There were fourteen complete ears, four of them with a short section of the shank still attached below the ear (Fig. 34). Six of the fourteen were round in cross section, the other eight being slightly elliptic, a condition com-

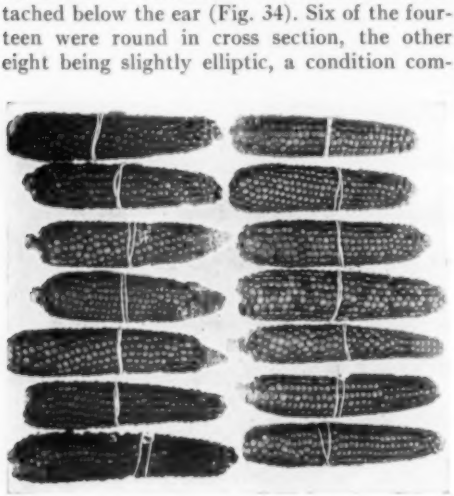

FIG. 34. Complete ears of corn from the cache bundle, Cottonwood Cave.

monly met with in Basket Maker maize. In no case was the ellipticity extreme enough to produce a difference of more than 3 mm. between the widest and narrowest diameters taken at the same point in the mid-ear region.

Like much prehistoric maize the ears were all more or less brownish. One had a distinctly reddish cast. It is probable, though by no means certain, that this one ear originally had a red pericarp and that the other ears bore yellow or white kernels which have become discolored with time. Several of the kernels were sectioned for study. They had a large central deposit of soft starch near the germ and a thick cap of hard starch around the top and sides. In other words they were not one of the softer textured types which are so characteristic of many collections from the Southwest.

The ears are all broadly cigar-shaped, tapering gently toward the tip and more abruptly (but still smoothly) toward the base. Most of the ears show good evidence of having been within tight husks, the base of the ear being strongly compressed and longitudinal striations being imprinted across the face of the grains. There is no indication of increased growth at the butt of the ear as in much modern Southwestern maize; the shanks are slender, the ear is not enlarged at the base, nor is there a differentiated basal zone with a different number or arrangement of rows of kernels.

The glumes at the base of the kernels are very large and in several of the ears protrude between the kernels enough to show on the face of the ear. This is an apparently primitive characteristic previously unreported for North American maize. There is no certain indication of the phenomenon called "multiplication" by Cutler, which results from two kernels being borne in each spikelet, instead of one. The kernels are small and almost isodiametric in cross section, being on the average 6 mm. wide and 4 mm. thick. Some of the kernels are set in a hexagonal arrangement like cells in a honeycomb (Fig. 35). While it does not reach full expression in any single ear, there is a more general tendency towards such a condition than in any other collection of North American maize which has been examined in the laboratory of the Missouri Botanical Garden.

Row number in maize has had a most complicated history. Apparently the most primitive sorts had 12 and 14 rows. From this original condition by quite different processes there were produced at least two sets of variants, one with strong tendencies to 8 rows, the other with fasciated ears producing as many as 20 or 30 rows. Both of these influences apparently reached the American Southwest in pre-

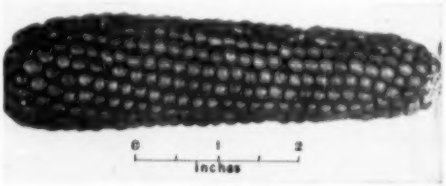

FIG. 35. Arrangement of kernels, ear of corn from Cottonwood Cave.

Columbian times. The maize from Cottonwood Cave shows little or no influence of either of these variants. Of the 14 ears, half show 14 rows and there are none with above 16 or below 12.

By diagramming simultaneously the kernel width and row number of each specimen in a scatter diagram, we may consider not only the characters of each ear but the character of the population. In a variable and cross-pollinated crop like maize the population is a more signifi-

cant unit than the individual. When this is done we find that the population (Fig. 36) is a coherent one, half of the 14 ears having 14 rows and kernels 6 to 7 mm. wide, while the other seven ears depart gradually from this modal condition. While this does not prove that they were all actually raised from the same field, it offers no evidence that they were *not*. Considering how much two fields of maize usually differ from one another, it is likely that these fourteen ears all came from the same field and in the same season.

The results of measuring the collection are presented here in tabular form. In each case the first number gives the lowest value, the second

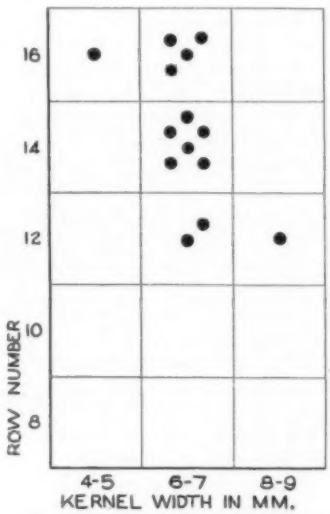

FIG. 36. Diagram of kernel width and row number, Cottonwood Cave specimens.

the average for the collection, and the third the highest value encountered.

Row number	12-*14*-16
Mid-ear width in mm.	27-*33*-35
Shank diameter in mm.	11-*13*-14
Kernel width in mm.	5- *6*- 8
Kernel thickness in mm.	4- *4*- 6

At five points in the Southwest, collections of a number of substantially perfect ears have been made, and the collections, or the published data, are accessible for comparison. For three of these collections there were over a dozen ears and the average of each of these three is fairly definitive for the collection. The range of each of these five collections and the positions of the three averages are shown in Figure 37. The collections are as follows:

1. Cottonwood Cave, the collection under discussion.
2. A collection from Yampa Canyon in northwestern Colorado made by Charles Scoggin and discussed by Scoggin and Burgh (in press).
3. A collection of ears from Tseabitso Cave in Canyon del Muerto made by Earl Morris and now deposited in the Museum of the University of Colorado. According to Dr. Morris the ears were found tied together as a bundle in the cave floor.
4. A collection of corn from Mummy Cave in Canyon del Muerto also made by Earl Morris. This collection is now in the American Museum of Natural History and has been measured and described by Anderson and Blanchard (1942).
5. Six ears found in a burden basket in Painted Cave in Arizona along with many bare corncobs. They have been described by Anderson in an appendix to Haury's (1945) report on the cave.

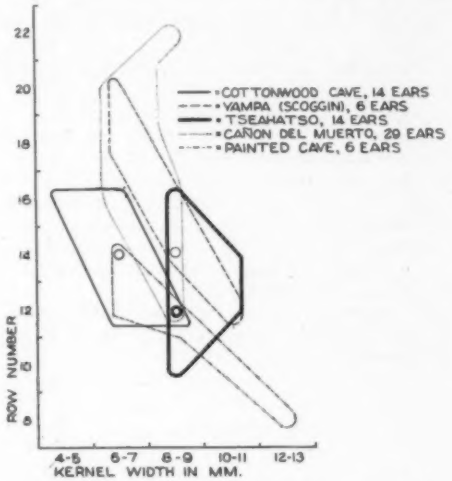

FIG. 37. Range of kernel width and row number, Southwestern collections.

As can be seen from Figure 37 the maize from Cottonwood Cave differs as a population from the four other collections available for comparison. It has smaller kernels and is without row numbers above 16 or below 12. It is, in other words, more similar to archaeological collections from such sites as Arica and Paracas in

South America than it is to most Basket Maker collections.

The resemblances of the maize from Cottonwood Cave are definite and practically indisputable. The interpretation of these facts is another matter. The outstanding points may be listed as follows:

1. The bundle is made up of ears and shelled kernels of a single, well-marked variety. They could well have been grown in the same field and in the same season, since their size frequencies are those of a coherent population.
2. The care with which the bundle was wrapped and the inclusion of nothing but virtually perfect ears might indicate either that it was a religious offering or that it was a selection of seed corn for the next season. It might be well to add parenthetically that a selection of seed corn may well have been considered religiously significant by these people.
3. The ears are broadly cigar shaped with prominent glumes, an unusual feature in North American maize. The kernels are small, hard, and nearly as high as wide. There is a noticeable tendency to cross-rowing. In all of these characteristics the specimens are more like prehistoric varieties from coastal Peru than any which have yet been reported from North America. On the other hand in the irregularity of their kernel size and shape and in the tendency for lower row numbers towards the tips of certain of the ears, they show definite resemblances to Basket Maker corn.

When it comes to interpretation, we would most like to know whether this collection of maize represented the common variety grown for food by the people who used the cave, or whether it was a special sort raised for religious ceremonies or used in some special way for which it was particularly suited. The small kernels suggest that it might have been either a popcorn or a brewing corn. Both of these uses of maize are very old and both require varieties particularly fitted for the purpose. The ancient varieties of the Toltecs survive in modern Mexico in such places as Toluca (Anderson, 1946) because they are superior as popcorn; it may be that the people who grew this maize had other sorts more like most collections of Basket Maker maize, which they raised as their main crop.

On the other hand it is quite possible that this may have been the only kind of maize grown by the people who left it. From Junius Bird's extensive collections in Arica, Chile, only a single well-marked variety of small-kerneled maize was found in the lower levels of an entire town (Bird and Anderson, MS)—a variety, incidentally, very similar to this one.

The chief conclusion which can be drawn is that maize has had a very complicated history in the American Southwest (Carter, 1945; Carter and Anderson, 1945). Several radically different types have been raised there: the one described here; the widespread larger-kerneled varieties of late Basket Maker times; the many-rowed pointed kerneled types (Yampa Canyon) so similar to the maize of modern Mexico (Scoggin and Burgh, MS); and the long-eared, wide-kerneled varieties like those of the eastern United States (Haury, 1945). Fortunately, these types in their extreme manifestations are very different from each other, so different that we can even deal efficiently with various mixtures between them. Now that the pioneer work of Lenz (1948) has demonstrated the chief lines of variation in that extraordinarily complex organ, the maize cob, it will be possible by cooperative investigation to reduce the various collections of prehistoric cobs to sets of codified facts. The early history of maize in the Southwest is apparently more complex than it once seemed. To interpret it correctly we shall need to know what kinds of maize were grown and at what times and places. The collection from Cottonwood Cave widens our understanding of the kinds of maize which reached the Southwest in prehistoric times.

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July, 1948

PITHOUSE NUMBER 1, MESA VERDE NATIONAL PARK

TERAH L. SMILEY*

AN early eighth century pithouse was accidentally discovered in Mesa Verde National Park during the spring of 1939 when workmen were digging a trench for a new pipe line. Before the trench was dug the area was thoroughly examined so that the digging would not cut through any prehistoric structure. There were no surface indications of this pithouse. During the actual laying of the pipe line workmen discovered the floor levels of the pithouse visible on the sides of the trench. The Park Service authorities decided to excavate the structure to preserve anything of archaeological value.

The pithouse is located on Chapin Mesa, 108° 29′ 27″ west, 37° 12′ 17″ north, at an elevation of 7,200 feet. Today a thick forest of juniper and pinyon trees covers the entire area.[1] The red topsoil is about 1.7 m. in depth and overlays a layer of shale. The floor of the pithouse is 1.25 m. below present ground level and well within the limits of this topsoil layer.

Approximately 30 m. to the northwest is a low mound covered with stones and sherds; the sherds are of the local Developmental Pueblo period. No other sites are known to be located in the immediate area.

Because erosion in this semiarid area is extremely slow, it is believed that the present floor depth of 1.25 m. is almost the same as when the pithouse was constructed. The struc-

FIG. 38. Pithouse No. 1, Mesa Verde National Park, before excavation. The floor is at the level of the hands. (Courtesy of the National Park Service.)

* The writer, a Temporary Ranger Naturalist at the time, was aided by other Naturalists in actual excavation.

[1] Figure 38, a photograph taken at the site, shows the density of this growth.

ture was orientated slightly to the east of south. Floor level measurements taken in relation to the axis were 4.85 m. east to west and 4.15 m. north to south. The bench, averaging 0.55 m. high and 0.23 m. wide, was well preserved on the north and west sides. It is believed that the bench had formerly been present on the east side as well because many rounded chunks of fire hardened clay, similar to the shoulder of the bench still in position, were found scattered along the east wall. All of the native earth walls in the main room had been plastered with a thick coat of clay. The plastering was poorly preserved. The floor was of hard packed clay and, except for numerous root penetrations, was in an excellent state of preservation.

Approximately one-half of the antechamber and the entire passage-way to the main room was destroyed by the trench (Fig. 39). The remaining portion of the antechamber floor was 0.91 m. below present ground level. By projecting the walls of the remaining half of this room, the size would have been approximately 1.95 m. north to south and 1.75 m. east to west. This room, separated from the main portion of the structure by 0.60 m., was deep enough that a tunnel could have served as the passage-way to the main room. The 0.34 m. difference in floor levels indicated either a sloping floor in the passage-way or a stepped entrance.

In the south central portion of the main room was a clay-lined firepit roughly rectangular in shape. Twenty centimeters to the north was a smaller pit filled with sand. This pit could have served as a pot rest or it could have been an early form of the sipapu so common to late pit-houses and kivas throughout the San Juan area. A smaller cist, filled with coarse gravel, was found in the northwest quarter of the room.

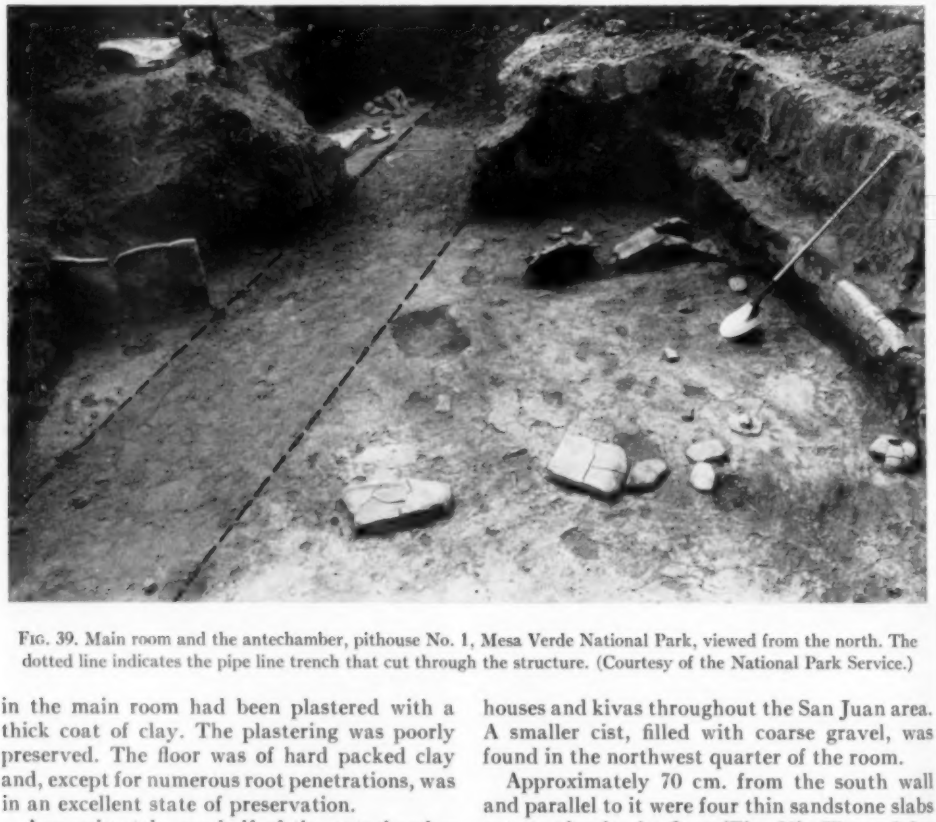


FIG. 39. Main room and the antechamber, pithouse No. 1, Mesa Verde National Park, viewed from the north. The dotted line indicates the pipe line trench that cut through the structure. (Courtesy of the National Park Service.)

Approximately 70 cm. from the south wall and parallel to it were four thin sandstone slabs set on edge in the floor (Fig. 39). These slabs, two on each side, extended from the east and west walls into the room a short distance, forming short semi-partitions. The entire floor area between the east partition and the south wall was covered with 3 cm. of fine charcoal and white ash. This material had the general appearance of having been extremely dry wood which quickly burned to a fine ash. A careful

examination of the floor and of all material thrown out in digging the trench failed to reveal any indication of a deflector.

Four large post holes were found, one in each corner, placed about a meter in towards the center of the room. These post holes averaged 18 cm. in diameter and were filled with fragmentary charcoal. A row of sidewall post holes, averaging 60 cm. apart, extended around the outside of the bench.

Floor contact sherds and vessels were all of the Lino wares.[2] Two complete vessels of Lino Gray were found: one of globular shape was about 23 cm. in diameter; the other, also of globular shape, was smaller and had a strongly recurved rim. Only four sherds and one large bowl fragment of the Lino Black on Gray ware were in floor contact. A fragmentary Lino Fugitive Red bowl was found in the antechamber.[3]

The two complete bowls were of the typical coarse texture common to Lino wares. The majority of the sherds, and the rest of the fragmentary vessels, were of a much better texture. They were almost too good to be classed as Lino; their paste was fine and their surfaces had a good polish.[4]

A smooth textured clay pipe, sometimes referred to as a cloud blower, and two clay "plugs" were found in a small hole in the bottom of the basin of a metate. The pipe was 88 mm. long and tapered from 18 to 30 mm. in width. The pipe bowl was 26 mm. deep and tapered to a small hole which ran through the length of the pipe. The use of the two small clay "plugs" is unknown. One plug was 55 mm. long and 11 mm. thick, and the other was 46 mm. long and 12 mm. thick.

Two sandstone metates were found in the main room and one in the antechamber, all in a badly shattered condition. They were probably shattered by heat when the structure burned. Two of the metates were triangular in shape and the other almost square. The triangular metate north of the sipapu had a small hole pecked in the bottom of the trough and it contained the pipe and the two clay "plugs." Another hole was pecked in the unused portion of rock in this same metate. This hole contained fragments of a Lino Gray bowl. The square metate in the northwest quarter of the room differed from the other two inasmuch as its basin was oval and not trough shaped. Possibly seeds or pinyon nuts were ground on such metates. Seven sandstone manos were found, three in the main room and four in the antechamber. All were mere slabs of stone shaped by blows from a hammerstone and with but one grinding surface.

Ten hammerstones of small river rocks and six fairly large, smooth rubbing stones were scattered throughout the two rooms. One large stone, located near the cist, was very well polished. Various authorities have considered such stones to be "floor polishers," "anvils," and "skin dressers."

A large grooved maul of sandstone was found in the antechamber. It measured 16 cm. long, 8.5 cm. wide, and 8.5 cm. thick. The groove was 2.5 cm. in width and from 2 to 5 mm. in depth. Similar mauls have been found in other Basket Maker and Developmental Pueblo sites.[5] A small flaked drill, tapering to a point on each end, was the only flaked tool.

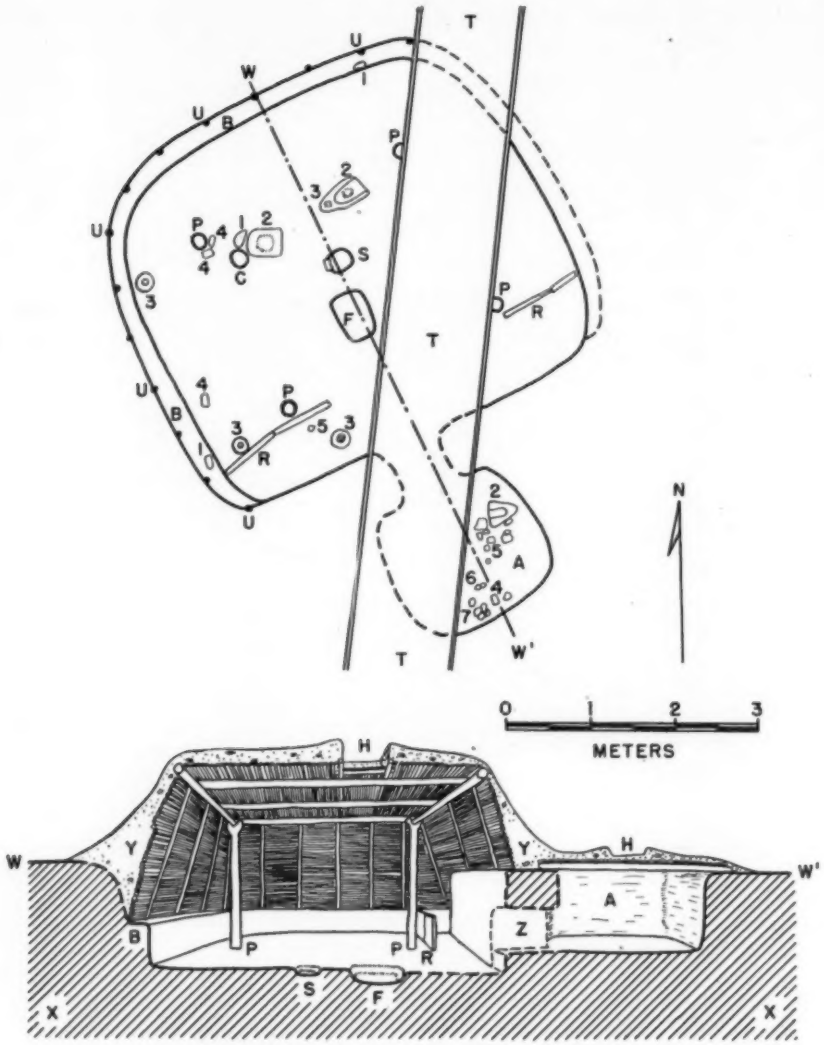
On the north bench immediately to the left of the rubbing stone was a large section of sidewall material in a charcoal condition. Another section of similar material was found on the bench near the southwest corner. This evidence, in the light of what is known of the roofing technique for such structures, would indicate that the roof was made in the following manner (Fig. 40). Four large posts were set in the floor, one near each corner. These posts, probably forked at the top, supported a square framework of large poles. Side-wall poles, spaced about 60 cm. apart, extended from the outer margin of the bench to the framework resting

[2] Pottery type designation is after H. S. Colton and L. L. Hargrave, "Handbook of Northern Arizona Pottery Wares," *Bulletin, Museum of Northern Arizona*, No. 11, Flagstaff, 1937.

[3] Lino Fugitive Red ware has not been reported heretofore in the immediate area. This vessel (its paste and temper were exactly the same as the Lino Gray ware) had traces of a red wash on the exterior.

[4] More extensive excavation of similar sites in this area may lead to a breakdown of this classification; the known evidence does not warrant such a breakdown. For a complete description of Lino pottery types in this area see J. A. Lancaster and D. W. Watson, "Excavation of Mesa Verde Pit Houses," AMERICAN ANTIQUITY, Vol. 9, No. 2, pp. 190–8, 1942.

[5] E. H. Morris, "Archaeological Studies in the La Plata District," *Publications, Carnegie Institution of Washington*, No. 519, Washington, 1939, Pl. 164, *f–h*; F. H. H. Roberts, "Shabik'eshchee Village," *Bulletin, Bureau of American Ethnology*, No. 92, Washington, 1929, pp. 134–6.



A ANTECHAMBER	S SIPAPU (?)	I SMOOTH STONES
B BENCH	T PIPELINE TRENCH	2 METATES
C CIST	U SIDEWALL POSTS	3 POTTERY VESSELS
F FIREPIT	X TOP-SOIL	4 MANOS
H HATCHWAY	Y EARTHEN MANTLE	5 HAMMER STONES
P ROOF POSTS	Z PASSAGE-WAY	6 GROOVED MAUL
R UPRIGHT STONE SLABS -- PROJECTED WALLS		7 PILE OF STONES

FIG. 40. Postulated reconstruction, pithouse No. 1, Mesa Verde National Park, superimposed on profile.

on the four main floor posts. To form the flat portion of the roof small poles, some probably split, were laid across the framework poles. Over these poles was a layer of juniper bark, which in turn was covered with a thick layer of earthen material. The side walls were formed by lashing small poles horizontally to the sidewall poles. Over these was placed a layer of juniper bark and earthen material. The presence of a fire pit in the main room indicated that there must have been an overhead hatchway or smoke hole.

The finding of a number of large charcoal fragments in the antechamber indicated that it was roofed (Fig. 40). It has been suggested that such rooms had a cribbed roof which would have given added height. Cribbing such as this should have left great quantities of charcoal when the structure burned; that is, of course, if the antechamber burned in a smothered fashion, as did the main roof. Although there were several large fragments of charcoal in this room, it is believed that not enough were found to indicate that a cribbed roof covered the antechamber. The absence of charcoal polebutts around the margin of this room would tend to rule out the idea of a conical roof. The presence of a metate and other work stones on the floor would have made some sort of roof opening necessary to admit light. This opening could have served as an entrance as well as for ventilation and light.

The pithouse was constructed, as evidenced by tree-ring material,[6] between A.D. 700 and 705. The summary of dates is as follows: one at 684, one at 686, two at 690, two at 692, one at 694, two at 695, one at 696, one at 698, and five at 700. Only in the specimens with final rings at 700 were the outside rings fairly constant. This consistency led to the belief that few, if any, rings had eroded since burning. Because no bark dates were found on any specimen, a five year interval is assigned, by the writer, for possible construction.

In floor outline, pithouse No. 1 closely resembled Proto-kiva 3, Site 19, excavated by Morris in the La Plata area.[7] This structure is a variant from Morris' structure inasmuch as it had side wall posts to form the aboveground portion of the room while Morris' structure had adobe walls. Brew excavated a similar structure at Alkali Ridge in southeastern Utah.[8] The Utah house was more nearly like the Mesa Verde one, except that the antechamber was roofed with four corner posts similar to the roofing in the main room. It is believed that this pithouse, constructed between the years A.D. 700 and 705, belongs to the era marking the close of the local Basket Maker and the beginning of the Developmental Pueblo period. The writer would type this pithouse with the La Plata structure as being a proto-kiva type.

Pithouse No. 1 is a continuation of the story of the development of the agricultural Indians in Mesa Verde. Excavations at Step House Cave,[9] Earth Lodge A,[10] and Pithouses B and C[11] have given the type of local development during the early seventh century. This structure provides information on the type of life during the last days of that century and the beginning of the next. Pottery was still crude but signs of superior workmanship were in evidence. Agriculture was the basis of the economy. The simplicity and symmetry of the structure indicate that the builders had a definite plan to follow when they started construction, perhaps ceremonial specialization. This specialization was to give rise to the well-known San Juan kiva, developed in this area within the next two centuries.

Laboratory of Tree-Ring Research
University of Arizona
Tucson, Arizona
July, 1948

[6] Fifteen specimens comprising 12 individual trees, all of Douglas fir species, were loaned the writer for study by Gila Pueblo, Globe, Arizona. Independent dating of these specimens by Dr. Deric O'Bryan, of Gila Pueblo, and the writer gave the same results with few exceptions and those of but a year or two difference. Examination of various fragments of the same tree will sometimes yield additional rings. A complete analysis of those specimens in possession of Gila Pueblo will appear in a future publication of that institution. Five specimens in the possession of the writer, one of which is from the same tree as one in possession of Gila Pueblo, are included in the summary. All dates given are those of the writer.

[7] Morris, *op. cit.*, p. 64.

[8] John Otis Brew, "Archaeology of Alkali Ridge, Southeastern Utah," *Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, Vol. 21, Cambridge, 1946, p. 177.

[9] Excavated by Superintendent J. L. Nusbaum in 1926. No detailed report was made of this excavation.

[10] J. W. Fewkes, "Field Work on Mesa Verde National Park," *Smithsonian Miscellaneous Collections*, Vol. 72, No. 1, Washington, 1920, p. 58.

[11] Lancaster and Watson, *op. cit.*, pp. 190–8.

ARCHAEOLOGY OF THE SAN AUGUSTIN PLAINS, A PRELIMINARY REPORT

WESLEY R. HURT, JR. AND DANIEL MCKNIGHT

THE San Augustin Plains of south central New Mexico contain several pluvial lake basins, on the terraces of which are numerous blowout sites with remains of Early Man.[1] The major portion of the Plains lies to the south of U. S. Highway 60, between Magdalena and Datil, New Mexico. This is the area of the basin of extinct Lake San Augustin. The small portion of the Plains to the north of the highway contains the basins of White Lake and North Lake. The Plains consist of a large basin some 60 miles long from northeast to southwest, varying in width from 20 miles at the northeast end to about 6 miles at the southwest. On three sides of the Plains are a series of mountain ranges, while on the west are the ranges that form the continental divide (Fig. 41).

The largest lake basin in the area was recognized and named Lake San Augustin by Bryan.[2] According to Powers the water in this basin covered an area 34 by 11 miles and had a depth of about 165 feet at its highest stage, 6940 feet. Its area of about 255 square miles was approximately 13 per cent of its drainage basin, which extended more than 1900 square miles.[3] To the northeast of this basin, connected by a narrow canyon, is another basin which has yet to be studied by geologists. Regarding this area, Powers states that "A longitudinal profile along the bottom of this valley indicates that it probably connected water into rather than out of Lake San Augustin."[4] Adjacent to the east mouth of this canyon lies a small playa near the C Bar N Ranch.

The terraces of Lake San Augustin occupy all the levels between 6850 and 6950 feet. Powers indicates that Lake San Augustin probably existed during the last Glacial stage and may have lingered into early Post-Glacial time. He states that "This dating is based on analogy with other extinct lakes of our arid Southwest, for it has not yet been possible to relate the shore features and sediments of Lake San Augustin to any stratigraphic sequence of Tertiary or Quaternary deposits . . . . The proved contemporaneity of the larger ancient lakes in the Great Basin, however, leaves little doubt that the 'pluvial period' of Lake San Augustin occurred at the same time. Whether Lake San Augustin had earlier stages corresponding to the earlier Pleistocene glaciations is not known from the evidence at hand . . . . It has already been pointed out that no diastrophism and very little alluvial fan development are known to have occurred here since Lake San Augustin existed."[5]

During the years 1946 through 1948 the writers made a reconnaissance survey of the terraces of Lake San Augustin, the playas of the C Bar N Ranch, and the White Lake area. Twelve sites were located and surface surveys were made (Fig. 41). As yet these sites have not been examined by geologists nor have stratigraphic tests been made in any sites other than Site 11 of White Lake.

SITES

Site 1 lies near the abandoned ranch called Layba Place, some three miles northeast of Horse Springs. The site itself covers an area about 1.5 miles long. Artifacts were found in a blowout area on the top and upper portions of the forward face of the terrace. No artifacts came from the sloping plains to the east, an area which appears to have been the lake bottom. The terrace is very prominent and rises some 30 feet. Several artifacts were also found on the graveled surface of a large alluvial fan that divides this site into Localities 1 on the north and 1A on the south (Fig. 41). Regarding the alluvial fans, Powers is of the opinion that the major portion developed when Lake San Augustin existed, in fact before the last stage

[1] The writers wish to acknowledge their indebtedness to Jack De Vaux and Lee Garner of Magdalena, New Mexico for the use of their collections and their help in locating the sites; to Frank Hibben for use of University of New Mexico laboratory facilities; and to Albert Schulman, James T. Crow, Herman Kaiser, and Robert Drake, University of New Mexico, for help in excavations.

[2] K. Bryan, 1926, pp. 81–7.

[3] Powers, 1939, p. 350.

[4] *Ibid.*, p. 355.

[5] *Ibid.*

of the Pleistocene.[6] Thus, although artifacts were found on the surface of this fan, they could be of considerable antiquity. It must be noted, however, that there is evidence of some recent alluviation in the area. In an arroyo bank southwest of Site 4 was found a cultural level containing Los Lunas Smudged-Upper Gila Corrugated pottery at a depth of some 2 to 15 feet.[7] This deeply buried site lies at the chips and flakes. In the canyons in the vicinity of Moore's Ranch house are several small shelter-caves, from which pothunters have excavated pottery of the general Los Lunas Smudged or Upper Gila Corrugated class.

Site 3 lies 3 miles southeast of the L. B. Moore Ranch house near Patt's Spring (Fig. 41). The site lies on a small dune formation in an area that appears to have been the slope of

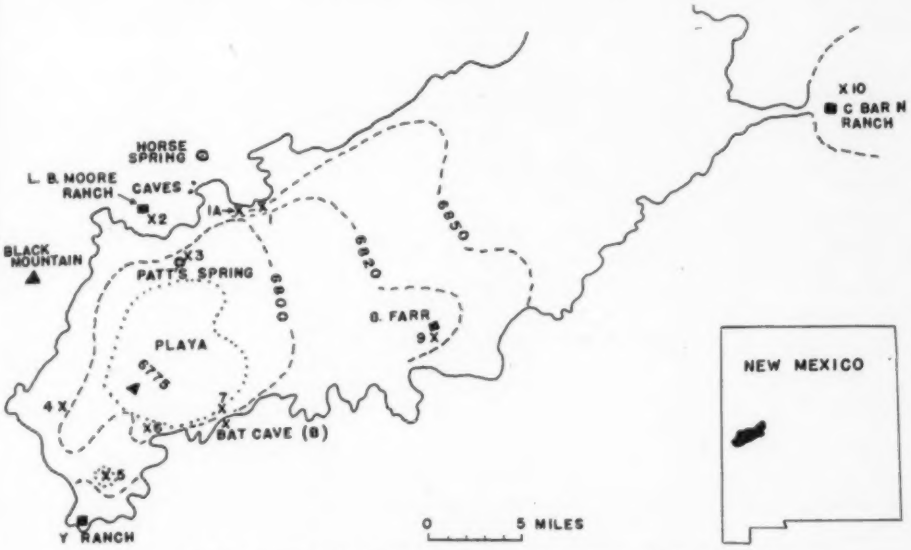


FIG. 41. Basin of Lake San Augustin, New Mexico, showing the locations of sites.

base of high hills rather than in a fan projecting into the lake basin as in the case of Locality 1A. Material gathered at Site 1 is mainly from the Pinto-Gypsum complex and Pueblo horizons. One projectile point of the single-side shouldered class, which may be related to the Sandia type, was also found.

Site 2 lies on the higher terrace of Lake San Augustin in front of the L. B. Moore Ranch house (Fig. 41). It is reported that many projectile points have been found on this site. The writers, however, obtained only a few worked the lake bottom. Judging from the Grazing Service map, this site is below the 6800-foot contour, that is, below the level of the lowest lake terrace.[8] Various scrapers and worked flakes of chalcedony were found, although no projectile points were noticed. Several sherds of the Los Lunas Smudged-Upper Gila Corrugated class were encountered. On the adjacent series of terraces to the west of Patt's Springs many patinated pieces of basalt were gathered, although no definite artifacts were found.

Site 4 lies along the lowest terrace of the south side of Lake San Augustin, approximately 12 miles to the southeast of Old Horse Springs (Fig. 41). The terrace at this point rises sharply from the floor of the lake basin to a height of some 35 feet. From there the terrace rises

[6] *Ibid.*

[7] According to Florence Hawley (personal communication, April 3, 1948) the differences between the two are minor. Upper Gila Corrugated has generally an all-over corrugated decoration and the Los Lunas Smudged generally has the decoration confined to an upper band along the rim. See also Hawley, 1936, pp. 36, 53.

[8] U. S. Government, 1941.

gradually in elevation from 6850 to a point some 6900 feet high a mile to the south at the base of a range of hills.[9] The site itself lies on a rounded peninsular area and covers the top of the terrace along the east and north sides for a distance of an eighth of a mile or more. The artifacts were found both on the surface and in blowouts. Although the artifacts were picked up in blowouts as deep as 5 feet they were still surface finds, none being excavated *in situ*. No artifacts were found at the base of the slope of the terrace nor on the bottom of the lake. They were scattered widely over the site. The Pinto-Gypsum complex was noted at this site. Projectile points of Pueblo types were also picked up.

Site 5 is on top of a rounded hill which appears at one time to have formed an island in Lake San Augustin (Fig. 41). This hill lies about 1.5 miles north of the Y-Ranch house, at the southeast border of the lake. Although flint chips were numerous, only a few stone artifacts were found. They included a single-shouldered point which may be related to the Sandia type, a point of the Manzano Gypsum complex, and a side-notched arrowhead of the Pueblo type.

Site 6 lies on the top of the lower terrace on the east side of Lake San Augustin at the base of some high cliffs, about 5.5 miles north of the Y-Ranch house (Fig. 41). The artifacts, mainly retouched flakes and chips, are widely scattered at this point.

Site 7 lies on top of the terrace at the base of Bat Cave, some 7.5 miles north of the Y-Ranch house (Fig. 41). Only retouched flakes, widely scattered over the area, were found.

To the east of this terrace lies Bat Cave (Fig. 41, Site 8). Exact measurements were not taken of the cave, which is estimated to lie some 200 feet above the bottom of the lake. The cave has been formed by wind and some water erosion and is of the "shelter" type. It is estimated to be some 150 feet wide and 150 feet deep. Several small tunnels extend from the northwest corner. These show evidence of occupation. The depth of refuse in the main cave is unknown, although holes in the cave excavated by guano hunters were over 6 feet deep and did not reveal the cave bottom. Several sherds of the Los Lunas or Upper Gila Corrugated class were found in the top levels of the cave as well as many painted compound arrows, cordage, and fragments of sandals. Excavation was postponed because of the severe weather at the time of the writers' survey in the winter of 1946.

Site 9 was not surveyed by the writers and may actually consist of several sites lying in the immediate vicinity of the G. Farr Ranch (Fig. 41). The collections taken from the area by local ranchers, however, were studied. The material in the collections range from Sandia to Pueblo points.

Site 10 consists of several blowouts located on the lower terraces and sand dunes of the lake basin in the vicinity of the C Bar N Ranch (Fig. 41). As previously mentioned, this basin has not been surveyed by geologists, but it apparently connected at high water level into Lake San Augustin. In well-digging operations, fossil elephant bones were excavated by ranchers. Materials from the blowouts of this playa range from a point that may be related to Sandia, many types characteristic of the Manzano-Gypsum and Pinto complexes, and a Folsom point to Pueblo arrowheads. In the bottom of a nearby basin in this area Lee Garner of Magdalena found two broken Folsom points.

To the north of Lake San Augustin lies another large basin, which contains two playas known as North Lake and White Lake. A series of terraces lie around the borders of this basin and indicate that this may be the site of another large lake of the same period as Lake San Augustin. As yet this area has not been surveyed nor studied by geologists. Thus all information regarding it must be considered tentative. Grazing Service maps exist for this area, and the information shown on them is utilized to indicate the possible extent and elevation of another extinct pluvial lake.[10]

At the north end of the basin between the elevations 7100 and 7200 feet are White Lake in T. 1 S., R. 7 W. and North Lake in T. 1 S., R. 8 W. The bottom of the basin appears to be outlined by the 7000-foot contour. If White Lake and North Lake be considered remnants of the postulated lake it would occupy an area between the 7000- and 7200-foot contour with 7150 a probable location of the highest terrace. The terraces in some sections are replaced by a long, gradual slope. This causes difficulty in correlating the terraces of one area with that

[9] *Ibid.*

[10] U. S. Government, 1938, 1940.

of another without an accurate survey. Furthermore, the number of terraces in one area differs from that in another. Assuming that the elevations given above were the bounds of the lake, its extent would be some 14 miles long north and south and 10 miles through its widest portion east and west. The lake would have been roughly tear-drop shaped, with its tip to the north enclosing what is now North Lake. The bottom of the basin is a flat, grassy area with mud holes. The sides are dotted with many small areas where in wet seasons ponds form all the way to the base of the third, or most prominent, terrace. None of the ponds, however, is larger than a few hundred feet across.

Site 12 begins on the most prominent terrace, probably the second one, at a point some three miles north of the abandoned C.C.C. Camp on U. S. Highway 60 between Magdalena and Datil. Artifacts are noted in blowouts extending over a two-mile area. The actual extent is unknown, for in many places wind erosion has not exposed the underlying artifact-bearing sand and gravels. The terrace here forms the east border of the basin, lying at an elevation of about 7100 feet. The site itself extends along what appears to have been an embayment and a peninsula. At the time of the writers' second visit in March, 1948, water was found to be present in a series of small ponds about a half mile to the east of the site.

The following formations were noted at this site in the vicinity of a human skeleton. The underlying formation of the terrace consists of a light yellow-colored damp sand mixed with alkali or caliche. When exposed to air, this stratum dries to a light buff or white color and becomes very hard, forming what is commonly called in the area "hardpan." When eroded in blowouts it separates into very hard-surfaced hummocks; as the result of deep wind erosion it forms terraces in the sides of the blowout because of its resistance to wind. It gives the appearance of being bedded in planes that parallel the surface contours of the terrace. As deep as two feet below its surface, the soil seems to be of the same formation but is very resistant to shoveling. No rocks, pebbles, or artifacts were noted in this layer.

The hardpan is exposed in large areas of the site along the forward face and in blowouts on top of the terrace. Resting on top of it, on the upper part of its forward face and on top of the terrace, is an artifact-bearing layer. This varies in depth from a few inches to as much as three feet on top of the terrace. It is composed of sand mixed with pebbles, small broken slabs of rocks, chips, small gastropods of the type still alive in the playas, bone fragments, and calcareous concretions. Many of the artifacts from this level are covered with caliche deposits. The sand is frequently denuded, leaving the heavier materials and artifacts resting on the surface of the hardpan. Above the artifact level is a layer of rippled, recently blown sand varying in depth from an inch or two on the forward face of the terrace to several feet on top. As yet this site has not been examined by geologists, and thus it is impossible to say what types of deposits are represented.

At the place where the burial was found, the terrace rises steeply some 30 feet and then slopes upward for 350 feet. The skeleton was 256 feet up the slope. There were a few inches of recently blown, rippled sand at the point of burial, but the artifact-bearing level had been eroded away. It was impossible to ascertain how much of the hardpan or caliche-sand layer had also eroded away before the burial was exposed. The skull, weathering out of the caliche was noticed by Jack De Vaux and Lee Garner. They removed the cranium and the major portion of the skeleton. It was lying on its right side with the knees drawn up to the chin, head to north and face to the west.[11] The site was subsequently examined by the writers, who, with a group from the University of New Mexico, excavated a trench 10 feet long, 3 feet wide, and 3 feet deep parallel to the burial. The left humerous and left clavicle were discovered to be *in situ*. The humerus varied in depth from 7 to 10 inches below the present surface of the hardpan, while the clavicle was from 3 to 5 inches. Small portions of the left parietal and other small bone fragments were also found *in situ*, varying in depth from 3 to 5 inches.

At a distance of 10 inches below the left humerus the same hard level of sand was noted which in blowouts forms the lower part of the hardpan. The top 6 inches of hardpan, in which the burial lay, was very compact, hard, dry, and of a light buff color. The sand further below the surface was damp and light yellow in color. When exposed by shoveling, it dried to the same color and degree of hardness as that on the

[11] Lee Garner, personal communication, Magdalena, New Mexico, May 7, 1948.

surface. The sand surrounding the bones was identical with that contained in the remainder of the hardpan.

No lines or any type of demarcation were noted to indicate that the burial was "intrusive." It is to be noted, however, that the overlying artifact level had been denuded by erosion. Thus, if there were any lines of soil disturbance, they have been destroyed. No artifacts or stones of any type were noted in the hardpan around the burial. It is probable that if the burial were intrusive, it was dug into this level by one of the groups represented in the superimposed artifact deposit. Since the latter has yielded not only an example of a Classic Folsom point, found some 50 feet south of the skeleton in sand above the hardpan, but also points of the Gypsum-Pinto complex, and Pueblo material, it is impossible to assign the skeleton to any one group of people.

The skeleton has yet to be studied by a physical anthropologist, and a more detailed report is planned in the future. The following features were noted by the writers. The skull was warped so that it is not at the moment possible to take the cephalic index or other measurements with any degree of accuracy. It was an adolescent female. The vault is very high and brachycephalic with the highest portion occurring 33 mm. to the rear of bregma. The face is very flat and has a broad nasal bridge. The orbits are square and the superorbital ridges, small. The back of the cranium shows lamboidal bulging and a small amount of occipital deformation. The skull is in a good state of preservation and mineralized, although the left malar bone and a portion of the left parietal are missing. The foramen magnum is narrow and elongated. The teeth show pronounced grinding, some of them being worn almost to the roots. The milk teeth remain in place of the first molars. The chin region is well developed.

The artifacts from the site cover a very wide range of types. They include an example of a Classic Folsom point; finely chipped, long slender lanceolate points; many tools characteristic of the Pinto-Gypsum complex; Pueblo arrowheads; a few sherds; many basin and slab metates; a number of one-handed manos. It is apparent that many groups camped on this site from earliest to recent times. The presence of antelope and duck, observed by the writers in the immediate vicinity, make this an ideal hunting area.

Site 12 lies approximately 0.5 mile north of the local C.C.C. Camp, at the point where the road crosses over a prominent terrace. It is near the southeast corner of the unsurveyed White Lake basin. Here we noted four terraces. The lowest, which borders the flat grassy plain at about the 7000 foot contour, is only three feet high. Halfway between this terrace and the one on which Site 12 is situated is a second terrace, rising some 20 feet. This terrace is about a mile to the east of the first one. The site itself rests on Terrace 3, some 30 feet higher. There is a large embayment here. The site is small and artifacts are rare, although flint chips are abundant. They come from an exposed level of sand mixed with small rocks and gravel, which underlies recent windblown sands. To the east, the land slopes gradually upwards to form a high crest of land which may represent the fourth and highest terrace. At the site were found manos, metates, retouched flakes, scrapers, and a small, serrated, side-notched point of the Pinto type.

ARTIFACT COMPLEXES

Because the artifacts were found on the surfaces of lake terraces and in blowouts, where recent Pueblo material is mixed with Folsom and Sandia, it is impossible on the basis of this survey alone to separate them into distinct assemblages. The answer may be provided by future excavation of Bat Cave, where there are deep, stratified cultural deposits. It is also possible that stratigraphic work in the terraces may give some clues as to the ages and the various associations of the material.

All the specimens described in this report came from sites on lower terraces of Lake San Augustin and the middle terraces of White Lake and the C Bar N playa. These are distinct from the Pueblo camp sites in the lake bottoms. Thus, regarding the age of these artifacts, it can definitely be said that they are not older than the time when the extinct lakes formed their last major terraces. In addition, some of the artifacts are undoubtedly recent in age, judging by the presence of typical Pueblo projectile points and sherds on some of the sites.

Fortunately nearly all the artifacts are of types similar to those from other sites such as Gypsum Cave, Sandia Cave, and the Cochise assemblages, where a better idea of their age has already been obtained. It is unnecessary to

point out in great detail the well-recognized dangers inherent in the comparative technique. For example, the "Gypsum Cave Point" found associated with the ground sloth at Gypsum Cave, Nevada, is estimated by Harrington to date from a period of about 8500 B.C,[12] yet this type of point can be found in many relatively late sites of the eastern United States. Thus, Cross illustrates examples from Salisbury New Jersey, a site classified in the "contact period," which was under way by the middle of the seventeenth century.[13] However, if one compares the San Augustin artifacts with those from nearer areas such as the Grants blowout sites, Sandia Cave, and the Cochise complexes, a higher degree of comparability in affinity and age can be expected. Again, if we use the criterion of the degree of specialization, we may expect some light to be shed on the San Augustin material. In the classification of artifacts we have made an attempt to point out the similarities with those of nearby areas in order to gain an idea of their relative ages and, where possible, the complexes to which they belong.

Beck has classified the San Augustin artifacts on the basis of types of stones in this fashion: The chipped stone artifacts fall into two general categories, chalcedony and volcanics. The chalcedonies vary in color and include some jaspers, an occasional chert, and some that may be petrified wood. The volcanics are of the felsic, mafic, and glassy varieties. In the felsic category rhyolites form the predominant class, while the basalts and an occasional andesite comprise the mafic type. Obsidian is present in its clear, translucent, and cloudy varieties.

The manos and metates are also made of volcanics, with the vesicular and amygdaloidal types forming the main groups. They range from vesicular basalt to various porphyritic materials such as andesite. Hammerstones include both the volcanics, and chalcedonies.[14]

CHIPPED STONE ARTIFACTS

The following description of the artifacts is arranged in numerical sequence of types as listed in Table 11 and illustrated on Figures 42–4.

Class 1 includes all artifacts which have the outline of a leaf or lozenge. Points and knives of this variety are not of great aid in placing our material because of their generalized distribution in time and space. Some of them are probably as old as any of the artifacts from the area, judging by their degree of patination. Varieties 1A1 and 1F resemble leaf-shaped points from the Pinto Basin,[15] Gypsum Cave,[16] and Grants' sites.[17] Variety 1B is similar in shape to points from Pecos[18] and Borax Lake.[19] At the latter site Harrington states that it is the most common form, occurring in all horizons.[20] Variety 1A2, a plano-convex type of artifact, may be similar to those noted by Rogers in Phase 1 of the Playa industry and to a few points in the Pinto-Gypsum complex.[21] Form 1E resembles in shape some of Ray's Clear Fork types.[22] Variety 1D and possibly 1E may fall into Rogers' Type 1 of Pinto points.[23] Leaf-shaped blades are also noted in the Lake Mohave sites.[24]

Class 1 artifacts are separated into a series of subtypes. Variety 1A is characterized by rough percussion chipping. Often portions of the original surface of the flake or nodule are present; one side of the artifact may be unflaked. A high degree of patination is seen on some specimens. One variety, 1A1, has an ovoid base (Fig. 42: 1). Another, 1A2, has a wider, flatter, blade and a more triangular shape (Fig. 42: 2). Type 1B is a large, symmetrical, flat artifact with a pointed base and a lozenge shape (Fig. 42: 3). Type 1C is characteristically a long, slender, flat artifact with a lanceolate shape (Fig. 42: 4). It lacks the fine, parallel or oblique, rippled flaking of a Yuma point, having instead a conchoidal type of fracture. The workmanship is good. In shape and technique it resembles an artifact from the Folsom level of Sandia Cave.[25] Again, it may be in the group of what was once called a "generalized Yuma."[26]

[12] Harrington, 1933, p. 128.

[13] Cross, 1941, p. 62, Pl. 17: 1, 2, 4.

[14] Carl W. Beck, personal communication, Geology Department University of New Mexico, April 26, 1948.

[15] Campbell and Campbell, 1935, Pl. 12:1.

[16] Harrington, 1933, p. 129.

[17] Bryan and Toulouse, 1943, Pl. XXII, *g, j*.

[18] Kidder, 1932, Fig. 2, A–E.

[19] Harrington, 1948, pp. 84–5, Pl. XX, *c*.

[20] Harrington, 1948, pp. 84–5, Pl. XX, *g*.

[21] Rogers, 1939, Pls. 12, *a, b;* Pl. 6, *c*.

[22] Ray, 1938, Pl. 18: 2.

[23] Rogers, 1939, Pl. 13, *p, q*.

[24] Campbell and others, 1937, p. 80.

[25] Hibben, Pl. 16, *g*.

[26] Howard, 1943, p. 227. Kreiger describes this form as an unnamed type which may belong to the same general horizon as the Folsom and Yuma. It is to be noted, however, that Kreiger's unnamed Type C has basal smoothing, lacking on the San Augustin specimens. Kreiger, 1947, Pl. 1, *c;* p. 23.

Variety 1D has its greatest width through the midline and has a tapered, rounded base (Fig. 42: 5). Type 1E differs in having a broad, rounded base with the greatest width close to base (Fig. 42: 6). Type 1F is a variation of 1A1 except that it is more slender and thicker (Fig. 42: 7). It resembles in shape certain

TABLE 11. DISTRIBUTION OF ARTIFACTS BY SITES

	Site 1	Site 1A	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Possible Affinity
Type 1A1					1									Widely distributed
Type 1A2		1			2									Widely distributed
Type 1B										1				Widely distributed
Type 1C					1					1				Widely distributed
Type 1D					1							2		Widely distributed
Type 1E												1		Widely distributed
Type 1F										2		1		Widely distributed
Type 1G					1					1				Widely distributed
Type 2A					1									Widely distributed
Type 2B					1									Widely distributed
Type 2C					1						1			Widely distributed
Type 2D		1								1				Widely distributed
Type 2E		1												Widely distributed
Type 2F					1							6		Widely distributed
Type 2G1					1									Widely distributed
Type 2G2		1												Widely distributed
Type 3A	1													Sandia (?)
Type 3B						1								Sandia (?)
Type 3C											1			Sandia (?)
Type 3D					1					1				Sandia
Type 3E										1				
Type 3F	1													Pinto
Type 4A					2									Gypsum Cave
Type 4B					1					2				Borax Lake, Pinto
Type 4C					3									Gypsum Cave
Type 4D1	1				5	1				1		8		Manzano-Gypsum
Type 4D2					1									Pinto
Type 4D3	1									1		1		Pinto
Type 4E	1													Manzano
Type 5A					1									
Type 5B											1			
Type 5C												1		
Type 6A	1													Pinto-Gypsum
Type 6B					1									
Type 6C										3		1		Pueblo
Type 6D												1		
Type 6E					1									Pueblo
Type 6F1	1													Pueblo
Type 6F2	1									1				Pueblo
Type 6G												3		Pueblo
Type 7A												1		Pueblo, Pinto
Type 7B	1				1								1	Pueblo, Pinto
Type 7C												3		Pueblo
Type 7D					1							1		Borax Lake, Pinto
Type 8A					2					1				Pinto
Type 8B	1				1					3		1		Pinto
Type 8C										1				Pinto
Type 8D1					1									Pinto
Type 8D2	2													Pinto

TABLE 11. DISTRIBUTION OF ARTIFACTS BY SITES (*Continued*)

	Site 1	Site 1A	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Possible Affinity
Type 8D21											1			Lobos
Type 8D3												1		Lobos
Type 8E1											1	5		Lobos
Type 8E2											1			Lobos
Type 8F										1				Lobos
Type 9A					1						1			Lobos
Type 9B					1						1			Pueblo
Type 9C					1				1		2			
Type 9D	1				1						1			
Type 9E					1						2			
Type 9F1					1							2		
Type 9F2	1				1									
Type 9G					1									Pinto
Type 9H					1									
Type 9I					1									
Type 9J					1									
Type 9K					1									Borax Lake, Playa
Type 9L												1		Widely distributed
Type 9M												2		
Type 9N												1		
Type 90										1				
Type 9P										1				
Type 9Q1										1				Folsom
Type 9Q2												1		Folsom (?)
Type 9R												1		Folsom (?)
Type 9S												1		Lobos
Type 9T												1		Lobos
Type 9U												1		Abilene (?)
Type 9V												1		Hohokam, Pioneer
Type 9W												1		Pueblo
Type 9X												1		Pueblo
Type 9Y												1		Pinto
Type 9Z												1		
Type 10A1					1									
Type 10A2					1									Pueblo
Type 10B1	1													
Type 10B2					1									
Type 10C1	1				1									
Type 10C2					1									
Type 10D1					2									Widely distributed
Type 10D2	2				6						14			Widely distributed
Type 10E					1						2			Widely distributed
Type 10F	3				4	1	1				19			Widely distributed
Type 10G1		1			1						6			Widely distributed
Type 10G2	1				2						12			Widely distributed
Type 10H		1			1	1					17			Widely distributed
Type 10J1	1													Borax Lake
Type 10J2		1												
Sherds				7			16		6		35			
Miscellaneous flakes and chips	107	21	30	15	133		10	25	30		208	45		

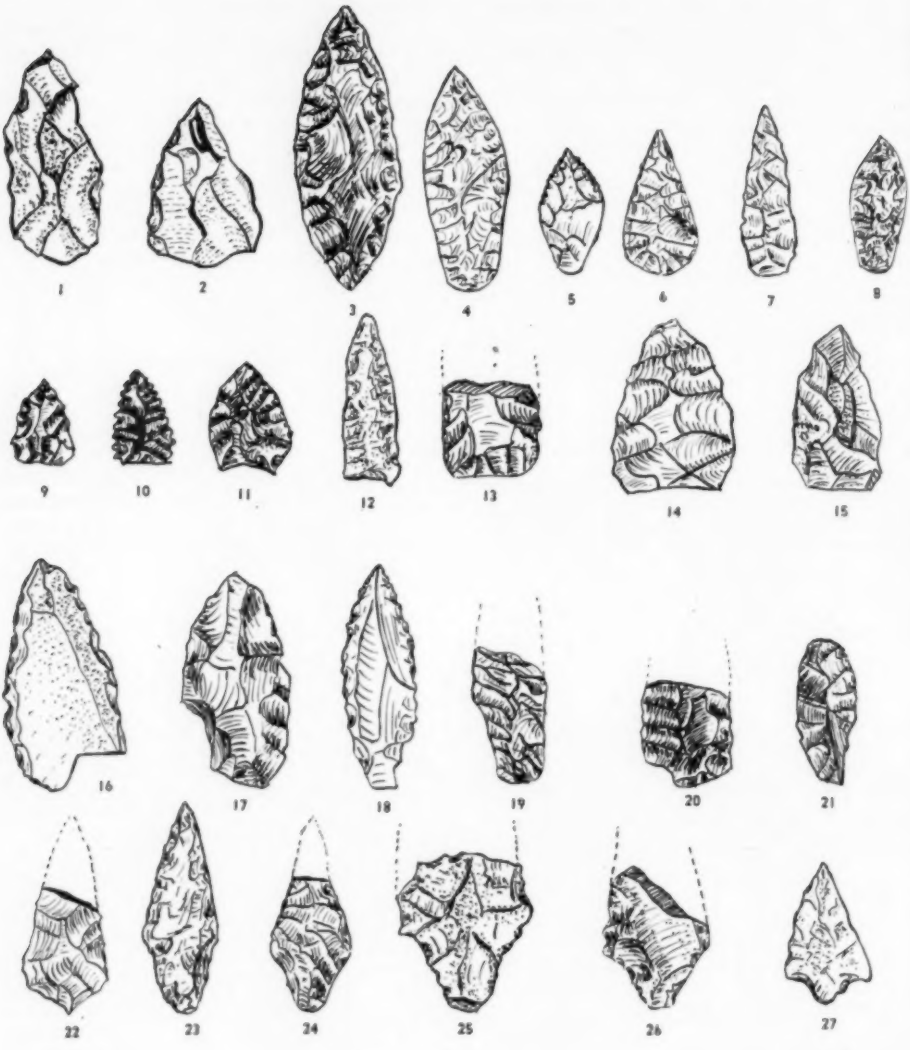


FIG. 42. Projectile points from the San Augustin Plains, New Mexico. (See facing page for identifications.)

points from early horizons of Texas, differing in that basal thinning was not noted.[27] Type 1G resembles Type 1D but is much smaller (Fig. 42: 8).

Class 2 includes artifacts with a triangular shape. A wide range in form, dimensions, and chipping technique was noted. The resemblances of this group vary from type to type.

Types 2A, B, C may be late, for they have been reported from Pueblo sites; Kidder illustrates Type 2A from Pecos,[28] and Diddert and McConnell found this type in Pueblo ruins near Cebolleta Mesa, to the north of the Plains.[29] No patination was observed on Types 2A, B, and C. Type 2A is characterized by a triangular shape two-thirds as wide as long (Fig. 42: 9). Variety 2B is similar in shape with the exception that it is serrated (Fig. 42: 10). Type 2C has a slightly constricted concave base (Fig. 42: 11). Type 2D has a long, slender shape with concave base (Fig. 42: 12).

Variety 2E is a large point of long, square-based type with parallel sides. It lacks the fine chipping and basal grinding of a Yuma point. The chipping has formed both long parallel and conchoidal flakes (Fig. 42: 13). Variety 2F is a large, broad, triangular blade (Fig. 42: 14). This may fall into Rogers' bi-faced class of blades in the Gypsum-Pinto complex.[30]

Variety 2G could not serve well as a projectile point. It has one flat unflaked surface, while the other is roughly pyramidal in shape and poorly flaked (Fig. 42: 15).[31] The Playa and the Gypsum-Pinto complex of the Lower Colorado contain a series of plano-convex knives which may be related.[31] Type 2G1 consists of long, triangular blades with only one surface flaked and a plano-convex cross section.

Class 3 includes artifacts whose chief characteristic is a single side notch or shoulder. In this group certain resemblances are noted with the Sandia point. Types 3A, B, C, differ radically from the Sandia point and may form a distinct class. These three types have only one surface of the artifact flaked; Type 3A has only the edges of one side chipped. Type 3D, however, resembles closely the Sandia point, Type 2.[32] It differs in that the base is not chipped to form a slightly concave edge; instead, it has a square base with rounded edges.

The following is a more detailed description of each variety: Type 3A has two unflaked surfaces. The edges of only one surface have been chipped, on both the sides and base (Fig. 42: 16). Type 3B is similar in outline. Only one surface has been flaked while the other is flat and untouched. On the example shown, the side-notch appears to have been added at a later date for it has less patination than the blade (Fig. 42: 17). Variety 3C is a long, thin, straight-based point with one unflaked surface (Fig. 42: 18). Variety 3D differs in that the stem is longer and both surfaces are flaked. It is a better made artifact (Fig. 42: 19). Type 3E has a very short stem. The side-notch is small and may be accidental (Fig. 42: 20). Variety 3F is a small artifact with a slender stem, single side-notch, and blunt nose; it may have been a hafted scraper (Fig. 42: 21). It resembles in form a specimen from the Pinto Basin, classified as a non-typical form.[33]

Class 4 includes various points with a constricted stem. Attention was drawn to this class by the excavation of Gypsum Cave, where it was found associated with extinct animals.[34] Hibben noted a variant in Manzano Cave, New Mexico, where it was also associated with extinct animals.[35] In Ventana Cave it was found with Pinto points in a recent level above the Folsom-like assemblage.[36] In the Lower Colorado area this class forms part of Rogers' Gypsum-Pinto complex.[37] Only one example was noted at Lake Borax.[38] It is also found in

[27] Ray, 1934, Pl. 18; Figs. 85–7, 98; pp. 109–10. See also Ray, 1938, Pl. 25: 2.

[28] Kidder, 1932, Fig. 2, *l*, *m*.

[29] A. E. Diddert and W. F. McConnell, personal communication, University of New Mexico, May 1, 1948.

[30] Rogers, 1939, Pl. 12, *c*. He does not note one with a square base.

[31] *Ibid.*, Pls. 6, *c*; 12, *a*, *b*.

[32] Hibben, 1941, Pl. 12, *l*.

[33] Campbell and Campbell, 1935, Pl. 14, *l*.

[34] Harrington, p. 190.

[35] Hibben, 1941, p. 36.

[36] Haury, 1943, Fig. 15.

[37] Rogers, 1939, Pl. 14.

[38] Harrington, 1948, p. 91.

EXPLANATION OF FIG. 42. 1, Type 1A1; 2, Type 1A2, of basalt; 3, Type 1B, of obsidian; 4, Type 1C, of chalcedony; 5, Type 1D, of rhyolite; 6, Type 1E, of rhyolite; 7, Type 1F; 8, Type 1G, of chalcedony; 9, Type 2A; 10, Type 2B, of obsidian; 11, Type 2C, of obsidian; 12, Type 2D, of basalt; 13, Type 2E, of chalcedony; 14, Type 2F, of chalcedony; 15, Type 2G, of basalt; 16, Type 3A, of rhyolite; 17, Type 3B, of rhyolite; 18, Type 3C, of chalcedony; 19, Type 3D, of chalcedony; 20, Type 3E, of basalt; 21, Type 3F, of basalt; 22, Type 4A, of basalt; 23, Type 4B; 24–6, Type 4C; 27, 28, Type 4D; 29, Type 4D1; 30, Type 4D2; 31, Type 4D3; 32, Type 4D; 33, Type 5A, of basalt; 34, Type B5, of chalcedony; 35, Type 5C, of chalcedony. Scale 4/7.

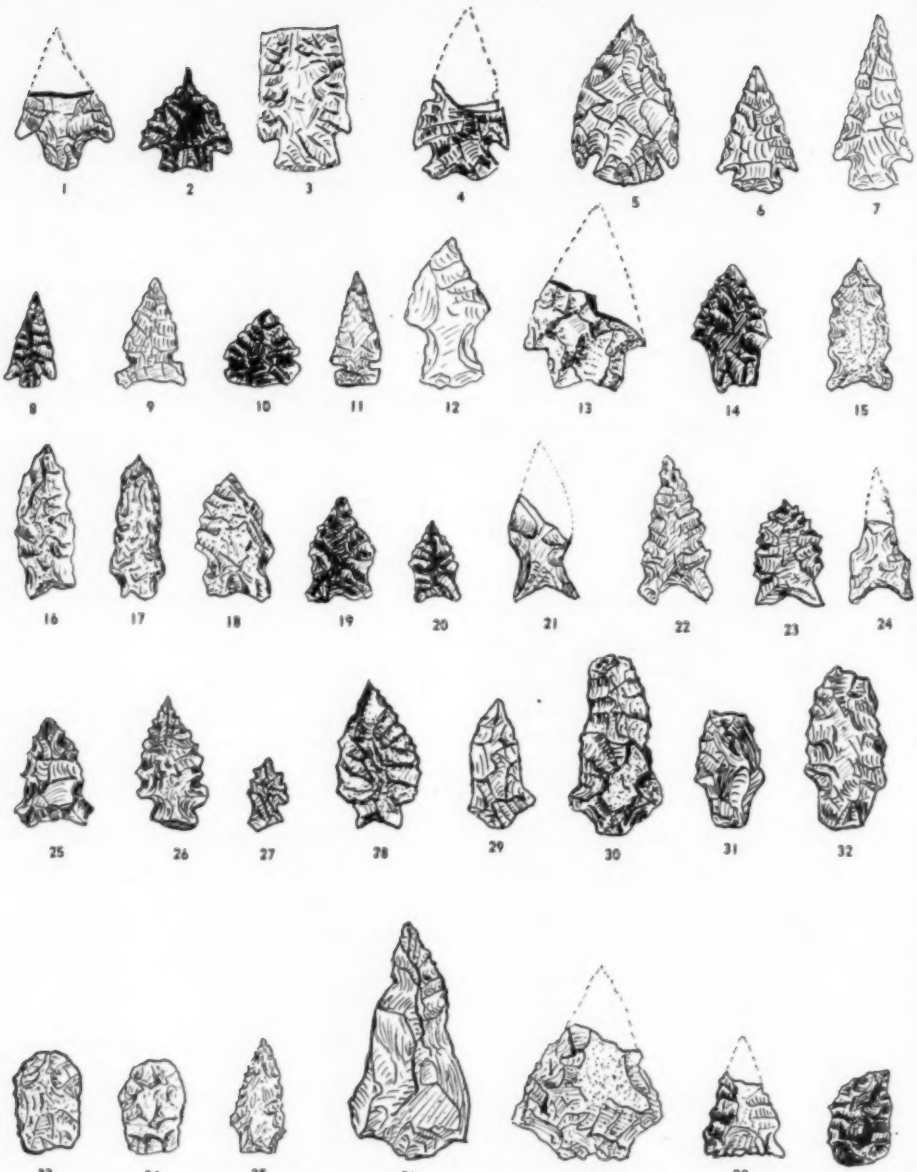


FIG. 43. Projectile points from the San Augustin Plains, New Mexico. (See facing page for identifications.)

Montrose County, Colorado.[39] In Texas it appears in the Pecos River Focus.[40] This class of points has a very wide distribution in other areas. For example, Fairbanks mentions its occurrence at Stalling's Island, Georgia, a site which has preceramic levels.[41] Roberts notes its presence in eastern New Mexico, Arkansas, Missouri, Georgia, New Jersey, and New York.[42] At the Lindenmeier site an example was found in a soil zone above a stream bed cutting two feet above the Folsom level.[43] Roberts states that, when found in archaeological sites, this class of points is usually in the lower levels associated with older phases of various complexes.[44]

Contained within this class at San Augustin are several varieties, all of which may not be from the same assemblage. Variety 4A has a very short-pointed base and rounded shoulders (Fig. 42: 22). The tip has been broken. This is more typical of the Gypsum Cave variety.[45] The ones with the flared and more distinct shoulders are of the Manzano variant.[46] Type 4B differs in having a much longer stem (Fig. 42: 23). This variant was noted in Borax Lake[47] and Pinto Basin.[48] Examples in San Augustin were made of basalt and rhyolite.

Type 4C varies from those above in having more definite shoulders (Fig. 42: 24–6). Basalt and rhyolite were favorite materials. Variety 4D consists of much smaller points with even more definite shoulders (Fig. 42: 27, 28, 32). In addition to basalt and rhyolite, obsidian was used. Types 4D1, 4D2, and 4D3 correspond to Type 2 in Rogers' classification of Pinto artifacts.[49] An example of 4D1 is illustrated as Figure 22: 29. Variety 4D2 differs in having rounded shoulders and slight serrations (Fig. 42: 30). Type 4D3 is similar but has definite serrations (Fig. 12: 31).

Class 5 includes square-based, square-shouldered points. This variety is not common in the area but, judging by degree of patination, it appears to be as old as any. Ray mentions the occurrence of this shape from the early horizons of Texas.[50] He states also that points of this class from Texas show a high degree of patination, in fact more than Folsom points from the same area.[51] However, as has been pointed out by many investigators, patination alone is a poor criterion of antiquity. A specimen from the pre-pottery level of Ventana Cave may be of this type.[52] Examples have been noted at Borax Lake, variety 5B being similar to Harrington's "Borax Lake points," such as specimen *h*.[53] In the Blackland Belt of Texas Bryan found this class in both ceramic and non-ceramic sites.[54]

Type 5A, at San Augustin, is a small, square-shouldered point with square base (Fig. 42: 33). Variety 5B is similar except that it is blunt nosed (Fig. 42: 34). Type 5C has a more elongated stem and blade (Fig. 42: 35).

Class 6 includes points with a barb formed by corner notching or diagonal side notching. On the whole, these appear to be from the late horizons. Varieties 6C and 6G were found to be a major type on the Pueblo ruins in the vicinity of Cebolleta Mesa.[55] Types 6C, 6E, 6F1, and 6G are noted at Pecos.[56] At the SU Site 6E and 6F2 are represented in the Pine Lawn phase, which Martin estimates to be pre-500 A.D.[57] The

[39] Hurst, 1945, Fig. 12.
[40] Kelly and others, 1940, Figs. 1 and 2.
[41] Fairbanks, 1942, pp. 223–7, Fig. 23: 11.
[42] Roberts, 1940, p. 69.
[43] *Ibid.*, p. 70.
[44] *Ibid.*, pp. 69–70.
[45] Harrington, 1933, p. 44; Fig. 21.
[46] Hibben, 1941, Pl. 14, A–C.
[47] Harrington, 1948, Pl. XXIII, *b*, *e*, *f*.
[48] Campbell and Campbell, 1935, Pl. 14, *g*.
[49] Rogers, 1931, Pl. 13, *i*, *j*.
[50] Ray, 1934, Pl. 19: 67.
[51] *Ibid.*, p. 108.
[52] Haury, 1943, Fig. 15.
[53] Harrington, 1948, Pl. XIX, *h*.
[54] Bryan, 1930, Pls. 24: 6; 25: 4–10.
[55] A. E. Diddert and W. F. McConnell, personal communication, May 1, 1948.
[56] Kidder, 1932. Compare Type 6c with Fig. 3, *w;* 6E with Fig. 3, *x;* 6F1 with Fig. 3, *v;* 6G with Fig. 3, *aa*.
[57] Martin, 1943. Compare Type 6F2 with Fig. 72, A; 6E with Fig. 72, B.

EXPLANATION OF FIG. 43. 1, Type 6A, of obsidian; 2, Type 6B, of basalt; 3, Type 6C, of obsidian; 4, Type 6D; 5, Type 6E, of chalcedony; 6, Type 6F1, of chalcedony; 7, Type 6F2, of rhyolite; 8, Type 6G, of obsidian; 9, Type 7A, of chalcedony; 10, Type 7B, of obsidian; 11, Type 7C, of chalcedony; 12, Type 7D, of rhyolite; 13, Type 8A, of basalt; 14, Type 8A, of obsidian; 15, 16, Type 8B, of basalt; 17, Type 8C, of basalt; 18, Type 8D1, of basalt; 19, 20, Type 8D2, of basalt; 21, Type 8D3, of rhyolite; 22, Type 8E1, of chalcedony; 23, Type 8E2, of obsidian; 24, 25, Type 8F; 26, Type 9A, of basalt; 27, Type 9B, of obsidian; 28, Type 9C, of basalt; 29, Type 9D, of rhyolite; 30, Type 9E; 31, Type 9F1, of rhyolite; 32–4, Type 9F2; 35, Type 9G, of rhyolite; 36, Type 9H, of chalcedony; 37, Type 9I, of basalt; 38, Type 9J, of basalt; 39, Type 9K, of obsidian. Scale 4/7.

long, slender varieties resemble those from the San Pedro stage of Cochise[58] and types from the Brazos River, Texas.[59]

The following is a description of the San Augustin forms in detail: Type 6A is similar to Type 4D and perhaps should be so classified. It differs in having barbs in place of a round shoulder (Fig. 43: 1). According to Rogers, points of this class have always been found with the Pinto-Gypsum complex and may constitute a transitional stage in evolution.[60]

Variety 6B has slight barbs, a concave base, and a very thin needle-like point (Fig. 43: 2). Variety 6C is a large point with slightly expanded shoulders and small barbs. Above the barbs are two small side notches (Fig. 43: 3). The base of Type 6D is bifurcated (Fig. 43: 4). Type 6E has more of a leaf shape with long barbs having the widest portion above the barbs (Fig. 43: 5). Type 6F points have short stems, slight barbs, and expanded base. Two sub-types are found. Sub-type 6F1 is a broader, shorter variety (Fig. 43: 6). Sub-type 6F2 is a long variety with a thick, diamond-shaped cross section (Fig. 43: 7). The form is represented in the transitional level between the preceramic and pottery horizons of Ventana Cave.[61] No patination was noted on Types 6B–6F2.

Type 6G consists of finely chipped and retouched points with long barbs and small square stems. They are very well made (Fig. 43: 8).

Class 7 artifacts are characterized by side notches and a short, expanded base. Points of this type have been noted by the writers to be common on Pueblo ruins. Examples were found at Pecos,[62] and at the Cebolleta Mesa pueblo ruins.[63] Type 7A corresponds to Type 3 of Rogers' Pinto series, while 7B and 7D also are represented in the Pinto series as Type 4.[64] Varieties 7A, 7B, and 7C are associated with the Lobos complex of the Grants' blowouts. Bryan and Toulouse classify them as Pueblo points.[65] Type 7B is similar to points from Edwards Plateau, while 7D compares with types from Round Rock.[66]

The following is a more detailed description of these types: Variety 7A consists of small side-notched points with an expanded, bifurcated base (Fig. 43: 9). Type 7B is a short, broad point with a wide, rounded base and small side notches (Fig. 43: 10). Variety 7C consists of small side-notched points with short, broad stems and square bases (Fig. 43: 11). Type 7D differs in that it has a very wide, shallow side notch, a rounded base, and a long stem (Fig. 43: 12).

Class 8 is characterized by bifurcated-based points. With exception of Type 8F these are similar to the series of points from the Pinto Basin[67] and to Type 3 of the Pinto-Gypsum complex of the Lower Colorado. Type 8F resembles the Type 1 points of Rogers' Pinto series,[68] and was also noted by the senior writer in Russell County, Alabama. The serrated types of this class resemble points from the Grants' San Jose complex.[69] Unserrated examples are similar to the "intrusive" points of the Chiricahua stage, Cochise.[70] The Chisos Focus of Texas was characterized by points of this class.[71] Type 8A is similar to some of the "Borax Lake" points,[72] and to points from the Brazos River,[73] Lovelock Cave,[74] and Cave No. 2, Promontory Point.[75] These types are in sites from later horizons. Kidder found but four points of this class at Pecos.[76] Only one example was obtained at the SU Site,[77] while at the Cebolleta Mesa Pueblo ruins they were also rare.[78] In Ventana Cave this class of points occurred in the pre-pottery levels above the lower stratum containing Folsom-like points.[79] The general class of points was noted in southeastern Alabama by the senior writer, where, however, many were slightly channeled, a feature also found in Rogers' Pinto series[80] but not in the San Augustin series.

The following is a more detailed description of Class 8 points: Variety 8A has small shoulders and a square, bifurcated stem. Examples are of basalt and

[58] Sayles, 1941, Pl. XVI, *c*, *d*.
[59] Sayles, 1935, Pl. XI, *g*.
[60] Rogers, Pl. 20, *c*; p. 68.
[61] Haury, 1943, Fig. 15.
[62] Kidder, 1932, Fig. 4, *k*; Fig. 7, *k*; Fig 4, *f*.
[63] A. E. Diddert and W. H. McConnell, personal communication, May 1, 1948.
[64] Rogers, 1939, Pl. 13.
[65] Bryan and Toulouse, 1943, p. 273; Pl. XX, *a–d*.
[66] Sayles, 1935, Pls. XII, *f*; XIV, *d*.
[67] Campbell, 1935, Pl. 13.
[68] Rogers, 1939, Pl. 13, *k–o*, *c–d*.
[69] Bryan, and Toulouse, 1943, Pl. XIX.
[70] Sayles and Antevs, 1941, Pl. XI, *c*, *d*, *q*, *t*.
[71] Kelley and others, 1940, Fig. 3.
[72] Harrington, 1948, Pl. XIX.
[73] Sayles, 1935, Pl. XI, *c*.
[74] Loud and Harrington, 1939, Pl. 56, *n*.
[75] Steward, 1937, Fig. 41, *p*.
[76] Kidder, 1932, Fig. 8, I–L.
[77] Martin, 1943, Fig. 73, Type D.
[78] A. E. Diddert and W. H. McConnell, personal communication, May 1, 1948.
[79] Haury, 1943, Fig. 15.
[80] Rogers, 1939, Pl. 19, *c–f*; p. 68.

obsidian (Fig. 43: 13, 14). Type 8B points have an expanded base and small side notches (Fig. 43: 15). Type 8C differs in having a square stem (Fig. 43: 17). Variety 8D1 is a very wide point with expanded, concave base (Fig. 43: 18). Type 8D2 differs in that the stem is one-half the length (Fig. 43: 19). Variety 8D3 has a base with the shape of a fish tail (Fig. 43: 21). Varieties 8E1 and 8E2 are similar to the above except that they have serrated edges (Fig. 43: 22, 23). Type 8F differs in that the blade is narrower than the stem and has indented shoulders (Fig. 43: 24). Witte found this type in Clear Fork sites but noted that it was channeled,[81] a characteristic of Alabama specimens but not of those from the San Augustin Plains.

Class 9 includes a miscellaneous series of points, many of which are variants of points in the classes previously described. The affinities of the types in this group are particularly divergent.

Variety 9A may be related to the Pinto series. It differs from Class 8 in having a rounded instead of a concave base (Fig. 43: 26). It is similar to the Grants' Lobos series, classified as later than the San Jose.[82] Similar types at Borax Lake are classified as being of the Pinto series. In the latter site they were rare, only five subsurface finds being made.[83] Variety 9B consists of minute asymmetrical serrated points (Fig. 43: 27). Kidder found this type to be rare at Pecos.[84]

Variety 9C is a broad, leaf-shaped point with a short, narrow, bifurcated stem (Fig. 43: 28). It probably belongs to the Pinto series, although no examples of this type were noted in the literature. Type 9D is probably a variation of Class 3 points. It has an asymmetrical shape, a short rounded stem, and one flared shoulder (Fig. 43: 29). Variety 9E has a constricted, rounded stem and rounded shoulders. One of the shoulders flares and the tip is blunt. One surface is keeled with a portion of the original nodule, while the other is unflaked (Fig. 43: 30). This type may be related to the Playa series of plano-convex knives, although Rogers does not describe any shouldered examples.[85] Type 9F1 is another blunt-nosed artifact. It has slightly rounded shoulders and a square stem, which is about one-third the length (Fig. 43: 31). Type 9G has a very blunt nose, tapered stem, and rounded shoulders (Fig. 43: 35). It resembles Type 2 in Rogers' Pinto series.[86] Type 9H has a short, constricted base and square shoulders. In cross section it is triangular, since only one side is flaked (Fig. 43: 36). It may be related to Type 9E, another plano-convex artifact.

Type 9I is a broad, flat artifact with a square base, short constricted stem, and wide-angled shoulder (Fig. 43: 37). It is so broad it may have been a scraper. Variety 9J is a small, triangular arrowhead with a minute corner tang. The example shown has a beveled blade in the fashion of the "spinner" points of the Southwest (Fig. 43: 38). Variety 9K is a small beaked artifact with a plano-convex cross section (Fig. 43: 39). This variety was noted in Rogers' Playa complex[87] and at Borax Lake.[88]

Category 9L may be a variation of Type 2E. The artifacts in this category are better made and bear some resemblances to the Yuma point, lacking, though, basal grinding and fine chipping. As previously mentioned, this class is of too general a time space distribution to identify it as Yuma. It is represented by a specimen lacking the tip and base (Fig. 44: 1). The chipping is of both the conchoidal and long parallel types. Variety 9M is the base of another long, parallel sided point. The flaking is parallel and it does not always meet in center (Fig. 44: 2). It resembles in shape an example from a deeply-buried site in the Abilene section of Texas.[89] Variety 9N is a long, thin artifact with a short, bifurcated-based, incurving stem. The lower half of the blade is characterized by the fine, parallel Yuma type of flaking, meeting in the center. The upper half is slightly indented and is conchoidally flaked. There is no evidence of retouching, judging by the patination (Fig. 44: 3).

Variety 9O is a leaf-shaped blade with a rounded base and a large, single side-notch. It is very thick and has dull edges (Fig. 44: 4). Variety 9P is another asymmetrical blade with a rounded base, one straight cutting edge, and one edge tapered to form a sharp point (Fig. 44: 5).

Variety 9Q1 consists of the base of a roughly chipped fluted point (Fig. 44: 6). It differs from Classic Folsom points in that only one side is fluted. The narrow channel extends only half the length. Howard notes this type at the original Folsom site.[90] Several are in the Borax Lake Folsom series.[91] The base is straight with rounded corners; basal grinding is lacking. Type 9Q2 consists of a section of a Classic Folsom point with tip and base missing. It is thin and grooved on both sides with finely flaked edges (Fig. 44: 7). Type 9R is represented by a fragment with the tip and base missing. One surface is channeled. Whether this type is related to the Folsom is

[81] Witte, 1942, Pl. 6, Fig. 7.
[82] Bryan and Toulouse, 1943, Pl. XIX, *c*, *d*.
[83] Harrington, 1948, Pl. 33, *a*; p. 91.
[84] Kidder, 1932, Fig. 8, *d*.
[85] Rogers, M. J., 1939, Pl. 6, *e*; p. 30.
[86] *Ibid.*, Pl. 13, *h*.
[87] *Ibid.*, Pl. 7; *b*.
[88] Harrington, 1948, Pl. XXIX, *a*.
[89] Ray, 1930, Pl. 14: 7 p. 52.
[90] Howard, 1943, p. 228.
[91] Harrington, 1948, Fig. 25; pp. 60–81.

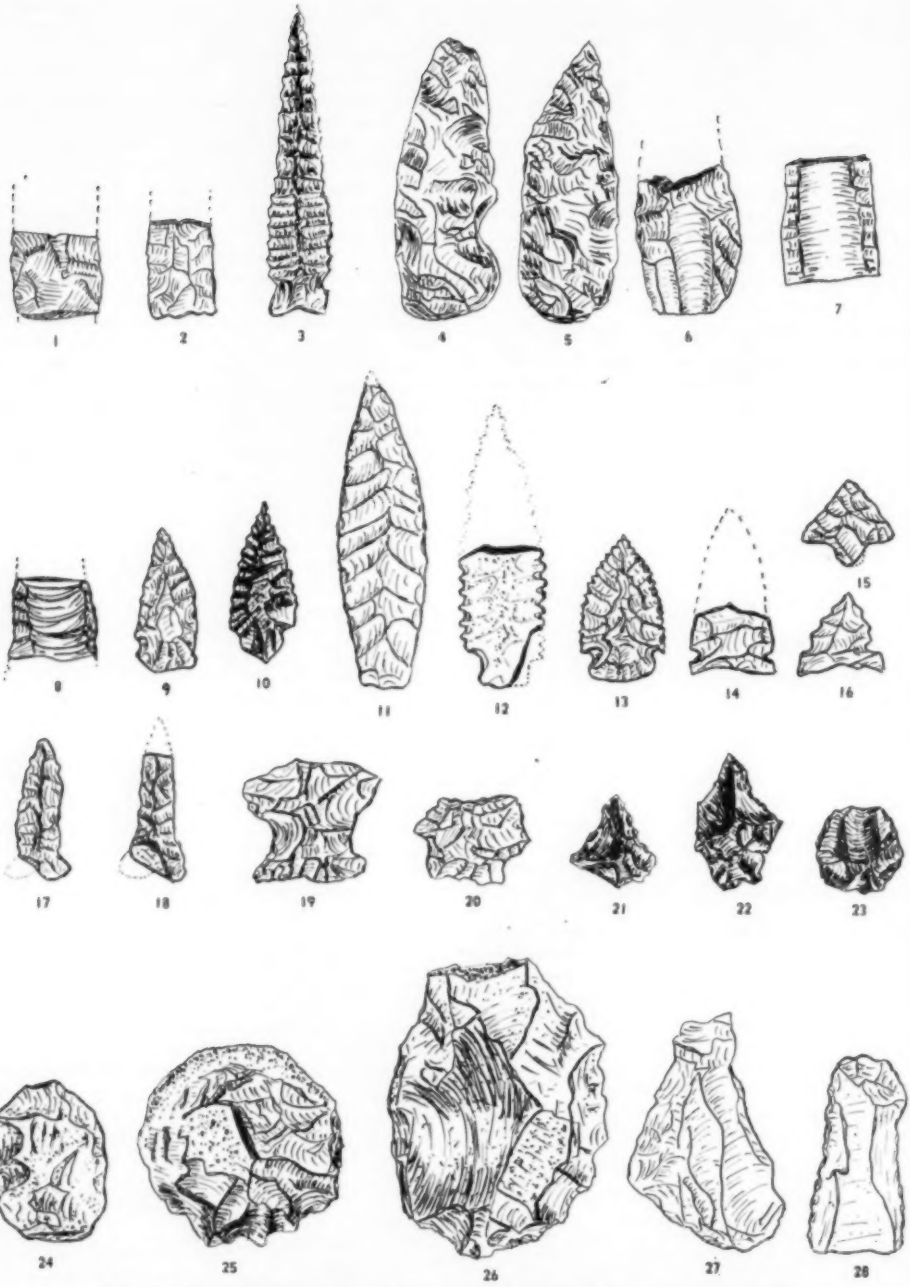


FIG. 44. Projectile points and other chipped stone artifacts from the San Augustin Plains, New Mexico. (See facing page for identifications.)

difficult to ascertain, for the channeling is shallow and may have been present on the original flake (Fig. 44: 8).

Type 9S is a small, thick triangular point with slight side notches and rounded edges. The slight serrations may be accidental (Fig. 44: 9). It resembles a type from the Lobos complex.[92] Variety 9T is a serrated point with rounded shoulders and a short, constricted stem (Fig. 44: 10). It also suggests affinity with the Lobos series.[93]

Type 9U is a large leaf-shaped point that may be related to Class 1C, 1G, 1L, 8L, and 8M points (Fig. 44: 11). In outline it is identical with an example described by Ray from deep sites in the Abilene region.[94] It shares the characteristic of the Abilene type of having a slight twist or bevel to the blade.[95] The specimen has the fine oblique parallel flaking of a Yuma point. An example from the Grants' blowouts was similar in shape, but lacked the diagonal rippled flaking.[96]

Type 9V consists of a fragment with tip and portion of base missing (Fig. 44: 12). It has even, deep serration, a long blade, small shoulders, and square stem. The flaking is rippled, meeting in the center and forming a lens-shaped cross section. It may be related to a type from the Sweetwater phase, Pioneer period of the Hohokam.[97] Type 9W is a finely serrated point with slight barbs, corner notched, and has an expanded base stem. Only one surface is flaked, although both edges have been retouched (Fig. 44: 13). It may be a variant of Class 6E points. Type 9X is a variation of the Pueblo type of side-notched point. It has a very short, concave-based stem (Fig. 44: 14). Variety 9Y is a small point with small side notches and a broad expanded, concave-based stem (Fig. 44: 16). It is suggestive of the type of "intrusive" points noted in the Chiricahua phase of the Cochise.[98] In Rogers' Pinto series it would probably fall into Type 4.[99] Type 9Z is a small, broad point with a constricted stem. Whether it is related to the Pinto-Gypsum series is difficult to determine (Fig. 44: 15).

Class 10 includes a series of drills, scrapers, choppers, blades, and knives. Probably none of them served as projectile points.

Variety 10A represents the typical Pueblo type of expanded-based drills. This type was noted at the Cebolleta Pueblo ruins[100] and at Pecos.[101] Sub-type 10A1 has a flat blade, while 10A2 has a cylindrical cross section (cf. Fig. 44: 17 and 18).

Variety 10B1 is a type of end scraper. Such scrapers appear to have been made by utilizing an arrowhead which had the tip broken off above the shoulders. The broken edge was chipped to a sharp cutting edge. An example has a large expanded stem with wide shoulders and wide side notches (Fig. 44: 19). Type 10B2 is smaller and has a concave cutting edge (Fig. 44: 20). This variety of scraper apparently has a wide distribution, the senior writer having noted examples from Alabama and Georgia.

Variety 10C may have been a type of end scraper. It has one flat flaked surface and one surface flaked to a pyramidal form. In outline it is diamond-shaped. One of the corners is elongated and may have been used for hafting (Fig. 44: 21, 22). These specimens appear to be too small for cores and their edges show use. All are of obsidian.

Type 10D includes several variations of bi-faced ovoid scrapers, differing considerably in size and showing considerable variation in degree of patination (cf. Fig. 44: 23 and 24). They are widely distributed in time and space in North America and thus are not of great value as a diagnostic trait. They appear in the Chiricahua and San Pedro phases of the Cochise.[102] Rogers observed this type in small numbers in the Malpais and Playa complexes, commonly in the Pinto-Gypsum complex, but rarely in the later Amargosa.[103] Examples are common in the Clear Fork complex[104] and at Borax Lake.[105] They were rare in the Pinto Basin,[106] while at Gypsum Cave,[107] Lake Mohave, [108] and Pecos[109] this form was absent.

[92] Bryan and Toulouse, 1943, Pl. XIX, *d*.
[93] *Ibid.*, Pl. XIX, *h*.
[94] Ray, 1930, Pl. 14: 7.
[95] *Ibid.*, p. 52.
[96] Bryan and Toulouse, 1943, Pl. XX, *e*.
[97] Gladwin and others, 1937, Pl. XCIV, *e*.
[98] Sayles and Antevs, 1941, Pl. XI, *d*.
[99] Rogers, 1939, Pl. 13, *r*, *s*, *t*.

[100] A. E. Diddert and W. H. McConnell, personal communication, May 1, 1948.
[101] Kidder, 1932, Fig. 12, *g*, *h*.
[102] Sayles and Antevs, 1941, pp. 13, 17, 18, 24.
[103] Rogers, 1939, pp. 20–9, 49, 62.
[104] Ray, 1938, Pl. 24: 1.
[105] Harrington, 1948, pp. 104–5.
[106] Campbell and Campbell, 1935, Pl. 14, *h*.
[107] Harrington, 1933.
[108] Campbell and others, 1937.
[109] Kidder, 1932.

EXPLANATION OF FIG. 44. 1, Type 9L, of chalcedony; 2, Type 9M; 3, Type 9N, of red jasper; 4, Type 9O, of chalcedony; 5, Type 9P; 6, Type 9Q1, of yellow jasper; 7, Type 9Q2, of red jasper; 8, Type 9R, of obsidian; 9, Type 9S, of chalcedony; 10, Type 9T, of obsidian; 11, Type 9U, of rhyolite; 12, Type 9V, of rhyolite; 13, Type 9W, of obsidian; 14, Type 9X; 15, Type 9Z, of volcanic glass; 16, Type 9Y; 17, Type 10A1, of chalcedony; 18, Type 10A2, of red jasper; 19, Type 10B1, of jasper; 20, Type 10B2, of chalcedony; 21, 22, Type 10C, of obsidian; 23, Type 10D, of obsidian; 24 Type 10D, of rhyolite; 25, Type 10E, of rhyolite; 26, Type 10F; 27, Type 10G1, of chalcedony; 28, Type 10G2; 29, Type 10H1. Scale 4/7.

Variety 10E has been classed as a bi-faced chopper. On the example illustrated, the upper half of the original stone has been rounded by pecking, while the lower half has been brought to a sharp cutting edge by rough flaking (Fig. 44: 25). This variety has the same distribution on the Lower Colorado as 10D except that the Amargosa complex lacks it.[110]

Variety 10F is a type of plano-convex scraper and chopper varying considerably in size, shape, materials, and degree of patination (Fig. 44: 26). Some specimens show evidence of use while others may be cores. In the Playa complex this form is rare, if not absent. It is common in the Malpais, while in the Pinto-Gypsum only the smaller variety has been noted in small numbers.[111] It is common in the Clear Fork,[112] Lake Mohave,[113] and Borax Lake complexes,[114] and in all three stages of Cochise.[115] It is reported as scarce in the Folsom[116] complex, while at Pecos[117] and in Gypsum Cave[118] such artifacts were not noted.

Variety 10G includes several types of asymmetrically shaped, flake knives, varying considerably in shape and amount of chipping. Type 10G1 is a knife with two cutting edges and a triangular shape. Only one surface is flaked (Fig. 44: 27). Type 10G2 is another variety made of long, rectangular flakes with one flat surface (Fig. 44: 28). The edges of such flakes are by nature sharp, although they have been retouched. In this class the form of the artifact follows the shape of the flake. It is of wide distribution. Thus, similar types are noted in the Folsom complex[119] and at Pecos.[120]

Rogers notes scrapers to be rare in the Pinto-Gypsum complex.[121] In the San Augustin Plains, snub-nosed scrapers, which have such a wide distribution in time and space are very rare.

Type 10H1 consists of choppers and scrapers with a wedge-shaped cross section. Sub-type 10H2 is very similar with the exception that the examples are made of large, thin flakes rather than from boulders. On both varieties the upper end may be rounded and represent the original surface of the stone or it may be flaked to a rounded or square form. The cutting edge may be retouched. The specimens vary in degree of patination and size, the larger ones serving probably as choppers or hand axes, the smaller ones as knives or scrapers. Some are ovoid and others semilunar in form. These artifacts differ from Variety 10F in that they have but one flaked cutting edge instead of two. Their distribution is similar to that of Type 10F. None was found in Gypsum Cave, however,[122] the only example coming from the gravel terrace in front of the cave. Choppers were noted in the Grants' sites, although a description is not given.[123]

Varieties J1 and J2 are a class of scrapers which have been called "spokeshaves." Their chief characteristic is a concave cutting edge (Fig. 45: 1, 2). This variety is noted in the Playa,[124] Borax Lake,[125] and Clear Fork complexes.[126]

GRINDING STONES

Both manos and metates were common in the Plains. The manos are all relatively small, ranging from 100 to 132 mm. in length and 24 to 74 mm. in width. They were all of the "one-handed type." They were made of local materials and appear to have been selected on the basis of surface texture rather than type of stone. It is possible to divide them into four groups, although the only real classification may be whether they have a flat or rounded surface.

Type 1 manos are very rough and show little attempt at shaping. Rather they are pebbles which have been used to a slight extent. In a collection of 43 specimens, 11 are of this type. A typical example is an oval mano measuring 105×91×54 cm. It is of vesicular basalt, and has a convex grinding surface and pecked sides, although the latter may be accidental (Fig. 45: 3). Type 2 manos are carefully made by pecking and grinding, and have been used extensively. Nine examples are of this type. A typical one is symmetrical, round, with two slightly convex grinding surfaces (Fig. 45: 4). It was found with a mano of Type 4 lying on top of a basin metate. Type 3 manos may be variants of Type 1 but they show greater use and shaping. They are larger than other types and have more than two grinding surfaces. Four examples of this type were found, one of which is quadrilateral, measures 112×78×61 mm., and was made of vesicular lava. Type 4 is rare, only two examples being found. They have been well used, wearing to a thin purposely wedge-shaped edge, with two grinding surfaces. One of them is roughly rec-

[110] Rogers, 1939, pp. 20–9, 49, 62.
[111] Rogers, 1939, pp. 18, 28, 29, 51.
[112] Ray, 1938, pp. 204–5.
[113] Campbell and others, 1937, Pls. XXVI–XXVIII.
[114] Harrington, 1948, pp. 104–8.
[115] Sayles and Antevs, 1941, p. 8.
[116] Roberts, 1935, Pl. 15, *i*, *j*.
[117] Kidder, 1932.
[118] Harrington, 1933, pp. 131–2.
[119] Roberts, 1935, Pls. 9–15.
[120] Kidder, 1932, Figs. 18–22.
[121] Rogers, 1939, p. 51.
[122] Harrington, 1948, Pl. 8.
[123] Bryan and Toulouse, 1943, Pls. XXIII–XXIV, pp. 271–3.
[124] Rogers, 1939, Pl. 8.
[125] Harrington, 1948, p. 101.
[126] Ray, 1938, p. 200.

tangular, with one convex and one flat surface. It measures 116×93×38 mm.

It is probable that the manos with convex surfaces were used on basin-shaped metates and those with flat suraces on the slab ones. Both of these types were found in equal numbers. Manos of these types occur in nearly all the horizons of the Southwest. They have been noted at Pecos, although the typical two-handed mano also was present.[127] They are found at Borax Lake,[128] in the Basket Maker or Early

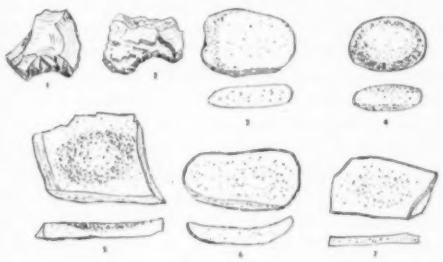


FIG. 45. Scrapers, manos, and metates from the San Augustin Plains, New Mexico: 1, scraper, Type J1; 2, scraper, Type J2; 3, mano, Type 1; 4, mano, Type 2; 5, metate, Type 1B; 6, metate, Type 2; 7, metate, Type 1A.

Pueblo horizons of Gypsum Cave,[129] in the Durst silt of the Abilene region,[130] in the Grants' sites,[131] and in the Pioneer Phase of the Hohokam.[132] They occur in all phases of the Cochise[133] and in the Pinto Basin.[134] Rogers questions that the mano and metate can be considered a part of the Pinto complex. He states that they were absent from many Pinto sites, and when found in the Pinto Basin, were on sites with pottery.[135] At Lake Mohave they were absent.[136]

The metates from San Augustin Plains were surface collections and thus cannot be assigned to any definite horizon. They are of two basic types, the basin and the slab varieties. No Pueblo troughed metates were found. The stones used were rough vesicular basalt and the smoother amygdaloidal types of volcanics. Both materials were used for both types of metates.

Type 1 metates can be divided into two sub-types. Sub-type 1A has a circular or oval grinding surface which was formed by grinding action alone (Fig. 45: 7). Flat, rectangular slabs were used, the specimen illustrated measuring 265×270×105 mm. Some have depressed grinding surfaces and others, a grinding surface so shallow that it is barely visible. Subtype 1B has a more definite and deeper grinding surface which may have been formed initially by pecking (Fig. 45: 5).

Type 2 consists of slab metates with one flat grinding surface. A typical example is of vesicular basalt, measuring 220×175×56 mm. with a grinding surface slightly concave from end to end (Fig. 45: 6).

Twenty-two metates were obtained, four from Site 4 and 18 from Site 11. Three from Site 4 were Type 1A and one was Type 1B. Seven from Site 11 were Type 1A, 4 were Variety 1B, and 7 were Type 2B. Their distribution was similar to that of the manos.

HAMMERSTONES

The San Augustin hammerstones are of the type common in the Southwest. They consist of little more than small stones the size of the fist which have been pounded on one or more surfaces. The materials utilized are the stones found throughout the area. A typical example is a rounded quartzite stone pounded on all sides.

POTTERY

Several sites in the area had a few sherds on their surfaces while a few sites, where sherds were abundant, appeared to be Pueblo camp sites. In the collection are a few examples of Los Lunas Smudged, one showing an incised exterior. A type of undecorated scored ware with grey paste was common. It may bear some relation to Alma Scored, although the latter has a brown paste.[137] Another type of pottery had a light buff to grey crackled surface.

CHRONOLOGY

Although the collection from the San Augustin Plains came from surface finds, a large number of the artifacts compare with complexes from nearby areas and thus give some clues to the local chronology. There is indication that

[127] Kidder, 1932, pp. 66–74.
[128] Harrington, 1948, pp. 112–13.
[129] Harrington, 1933, pp. 84, 85.
[130] Ray, 1940, p. 228.
[131] Bryan and Toulouse, 1943, p. 272.
[132] Gladwin and others, 1937, pp. 110, 105.
[133] Sayles and Antevs, 1941, p. 58; Pl. XVII; Fig. 11.
[134] Campbell and Campbell, 1935, Pl. 7.
[135] Rogers, 1939, p. 52.
[136] Campbell and others, 1937, p. 94.
[137] Hawley, 1936, p. 106.

Sandia Man entered the area, one "classic" point having been found. Unfortunately the exact provenience of this point is unknown. Sites on the lower terrace produced a type of single-side-notched point, which, however, differs in several details from the Classic Sandia points and may not be related.

The Folsom horizon was represented on the terraces of the lake basins in the northern part of the Plains. One Classic Folsom point, found at Site 11, gives a maximum age for the site and terrace.

Whether there was contact with the Sulphur Springs complex is unknown. All the artifact types of this complex are noted in the Plains. However, since the Sulphur Springs stage lacks projectile points, which are present in the Plains the relationship is dubious.[138]

There is only a suggestion in the Plains of relationship to the Lake Mohave and Playa complexes. They were not present on the sites located in this survey, for both Silver Lake and Lake Mohave type points were absent.[139]

Points similar to the Borax Lake type were collected. It is noteworthy, however, that many of the Borax Lake points are similar to ones found in the Pinto complex.[140]

Some similarity was noted to Abilene material, e.g., the long, slender, beveled lanceolate points. However, the total assemblage of Abilene and the later Clear Fork was absent. Thus, no examples of the Clear Fork gouge were found.[141] The artifacts which suggest relationship to the early Texas complexes are also, as noted before, similar to Borax Lake, Folsom, Lake Mohave, etc., material, so that it is not possible to state to which of the early horizons this group of artifacts is the most closely related. None of the types of Yuma points designated by the Laboratory of Anthropology Conference were found, although some points resembled the now abandoned class of "generalized Yuma."

The next horizon present in the Plains resembles closely the Pinto-Gypsum complex. The complex is represented practically *in toto*, as defined by Rogers[142] and Amsden.[143] The local variant of the Gypsum complex appears to bear greater affinity to the Manzano assemblage. Several phases of this complex may be present.

The presence of an early horizon bearing affinities to the Folsom and possibly Sandia Man and the Pinto-Gypsum gives rise to the problem of their relative dating. Powers has estimated that Lake San Augustin was contemporary with the larger extinct lakes from the Pluvial period of the Great Basin.[144] Powers did not, however, set dates on the various terraces, and, though it may be assumed that the lake gradually dried up after the Pluvial period, it is not possible to state at what period the lower terraces were formed nor how much water remained in the lake at the time the terraces were inhabited by man. Since Pueblo material is also found on these terraces, any date given them only sets a maximum date for the oldest artifacts rather than telling us the actual age. Thus, it is certain that the "hard-pan" level from which the burial was found at Site 11 is older than the last Folsom occupation of the Plains.

Although many estimates of the maximum age of Folsom points have been made, there is little to indicate how long this horizon lasted, other than its absence from Basket Maker and Pueblo sites. Folsom-like and fluted points have been found in the Chiricahua stage of Cochise,[145] Borax Lake,[146] Pinto Basin,[147] Rogers' Pinto-Gypsum complex,[148] and the Clear Fork series.[149] In some of these the association may be fortuitous and in others it is subject to question as to whether the fluted points can be classed as Folsom.[150] This does suggest, however, that late Folsom horizons may have overlapped slightly with the Pinto complex. No indication of this was found at Ventana Cave, however, for a time hiatus is suggested there.[151] Evidence from Sandia Cave suggests that Sandia Man was the oldest.[152] However, it may be that, in Sandia Cave, Sandia Man was older than the Sandia Folsom, which may not, for example, be as old as Folsom Man at Linden-

[138] Sayles and Antevs, 1941, p. 8.
[139] Campbell and others, 1937, Pl. XLI.
[140] Harrington, 1948, p. 83, Pl. XIX.
[141] Ray, 1938, pp. 197–8, Pl. 24.
[142] Rogers, 1939, pp. 47–60, Pl. 13.
[143] Campbell and Campbell, 1935, pp. 33–51.
[144] Powers, 1939, p. 355.
[145] Sayles and Antevs, 1941, Pl. XI.
[146] Harrington, 1948, pp. 60–81.
[147] Campbell and Campbell, 1935, p. 46, Pl. 14, *e*.
[148] Rogers, 1939, Pl. 19, *c*, *d*, *e*.
[149] Ray, 1934, Pl. 18, pp. 107–12.
[150] Rogers, 1939, p. 68.
[151] Haury, 1943, Fig. 15, pp. 221, 223.
[152] Hibben, 1941.

meier. In the Plains some of the slender lanceolate points, uni-faced knives, and "turtle backs" may be of antiquity as great as that of Folsom. Many of them are more highly patinated than the Folsom points, although this could be caused by greater exposure.

The Manzano variant of the Gypsum Cave horizon poses several problems, the first to consider being whether it was contemporary in its earliest phases with at least the late stages of Folsom. At Borax Lake a Gypsum Cave point was found at a depth of 42 inches, above and below which were Folsom points.[153] At the Lindenmeier site, a Gypsum Cave point was found two feet above the Folsom level.[154] Points of the Gypsum Cave type in Ventana Cave came from above the lower levels which have an apparent relationship to the Folsom horizon. Thus, in at least one site, Borax Lake, there is a suggestion that the Gypsum Cave points may have entered the Southwest during a later phase of the Folsom horizon. At the original site, Harrington found the Gypsum point horizon to be associated with ground sloth, horse, and camel,[155] while at Manzano Cave an association with ground sloth seems probable.[156] In its earliest phases the Gypsum-Manzano complex appears to have been contemporary with several varieties of extinct animals. A long time duration for this complex is suggested by the presence of the Gypsum Cave type of point in the Pecos River Focus from the Calamity Formations of Texas.[157] It may have extended there into the Chisos complex, estimated to be contemporary with the Grants' Lobos complex of about 800 to 1100 A.D.[158] Harrington places the occupation of Gypsum Cave following the end of the Pluvial at about 8500 B.C.;[159] while Rogers places the Pinto-Gypsum complex at about 800 B.C. to 200 A.D., falling sometime after the Little Pluvial of about 2000 to 1000 B.C.[160]

The problem of the relationship between the Pinto and Gypsum Cave complexes is raised by their apparent association in the San Augustin Plains. At Ventana Cave[161] and on many sites in the Lower Colorado and in the San Augustin Plains, these complexes appear mixed. There are sites in the latter area where, however, the complexes are separate.[162] At Gypsum Cave, Manzano Cave, and the Pecos River Focus only the Gypsum-Manzano points are found. At the Grants' sites, Pinto Basin, the Chisos Focus, and several others only Pinto material is represented. Thus it is suggested that these are basically two separate complexes but that in certain areas they have come together and mixed. Whether they both have the same duration in time it is impossible at the moment to ascertain.

The age of the Pinto complex is still debatable. As mentioned before, there is some evidence that the early phases of the complex overlapped the last of the Folsom horizon. The Campbells place the Pinto complex at the end of the Pluvial period[163] while Rogers places it as contemporary with the Gypsum complex somewhat later than the Little Pluvial of 2000 to 1000 B.C.[164] Bryan and Toulouse estimate that the San Jose complex, related to the Pinto, extends back to the erosion period following the Neville. They suggest contemporaneity of the San Jose with the Chiricahua stage of Cochise, and the Maravillas and Santiago complexes of Texas.[165] The "intrusive" points, among them a "fluted" or Folsom point, from the Chiricahua stage suggest affinity with the Pinto complex. This stage is estimated by Sayles to extend from 8000 to 3000 B.C.[166] Harrington estimates the Lake Borax site, which had a few Pinto-like points, to be at end of Great Pluvial when the Folsom culture was in transition.[167] As yet the only association of Pinto artifacts with extinct animals are on some sites from the Pinto Basin.[168] It is to be noted that they were surface finds and thus the association cannot be proved. Steward makes a debatable case for a Basket Maker horizon being older than a horizon with Pinto-like points in Cave No. 2 of Promontory Point.[169] Although the side-notched

[153] Harrington, 1948, p. 91.
[154] Roberts, 1940, p. 70.
[155] Harrington, 1933, p. 166.
[156] Hibben, 1941, p. 36.
[157] Kelley and others, 1940, Figs. 1, 2.
[158] Bryan and Toulouse, 1943, Table 2, p. 278.
[159] Harrington, 1933, p. 188.
[160] Rogers, 1939, Pl. 21.
[161] Haury, 1943, Fig. 15.
[162] Rogers, 1939, p. 48.
[163] Campbell and Campbell, 1935, p. 51.
[164] Rogers, 1939, Pl. 21.
[165] Bryan and Toulouse, 1943, pp. 277–80.
[166] Sayles and Antevs, 1941, Pl. XI.
[167] Harrington, 1948, p. 133.
[168] Campbell and Campbell, 1935, pp. 23–4; Pl. 5.
[169] Steward, 1937, p. 104.

points illustrated may be classified as Basket Maker they are not unlike several varieties of the Pinto complex, if one can judge by the illustrations.[170] In both Cave No. 2 of Promontory Point and Lovelock Cave[171] the lowest levels which had points similar to the Pinto complex rested directly on top of a sterile horizon deposited by nearby extinct lakes. Neither Steward nor Loud and Harrington observed any evidence of a time hiatus between the artifact level and the lake gravels.[172]

Judging by the evidence to date, there is no unquestioned evidence that the Pinto complex was associated with extinct fauna. With the possible exception of Borax Lake there is no suggestion that this period extended back into the Great Pluvial. In some areas it appears that the Pinto complex was contemporary with the last of the Folsom horizon and in others that there was a time gap. That the Pinto complex was not a simple assemblage has been noted by Rogers[173] and Amsden,[174] who attempt to divide their material into types with some chronological order. Bryan and Toulouse divide the artifacts from the Grants' sites into an early San Jose complex, roughly correlated with the Chiricahua, and a later Lobos phase overlapping with Pueblo I.[175] The Chisos phase in Texas, which has some Pinto-like points, is estimated to date at about 800 to 1400 A.D.[176] Thus, if we are looking for a complex to fill the often suggested gap between the Folsom and recent horizons, it could be filled, on the basis of present evidence, by a large horizon which could be called the Gypsum-Manzano-Pinto.

The problem of allocating the manos and metates found on the sites is difficult. They do not form a feature of the Folsom or Sandia horizons in the Southwest. They extended, however, into the earliest stage of the Cochise, the Sulphur Springs, and were associated with extinct mammals.[177] Rogers questions their association with the Pinto complex[178] and at Gypsum Cave they appear to come from the later Basket Maker levels.[179] In the San Augustin Plains manos and metates were found on all sites which had the Gypsum-Pinto complex, although this association may be fortuitous. No Pueblo types of troughed metates or two-handed manos were found. The Cochise area lies adjacent to the Plains at the southwest end. Thus it is possible that manos and metates entered the Plains at an early date. We must, however, await excavation in Bat Cave, where there is a chance to find the material in stratigraphic sequence, to answer such problems.

CONCLUSION

The first people to enter the San Augustin Plains and camp on the terraces of the now extinct lakes of that area appear to have been Folsom and Sandia. Later, while some of these early hunters may have been still surviving, groups related to those of Gypsum Cave and the Pinto Basin arrived. These two groups probably entered the area about the same time and mixed. During this time a few extinct animals such as the ground sloth, camels, and horses may have lingered, although the evidence for this is inconclusive, as it comes from other areas. Some of these groups may have contacted the Cochise peoples during the Chiricahua stage. It is possible that the mano and metate were acquired by the Pinto-Gypsum hunters during this time. That there was some water still in the lakes seems probable, for their sites are located only on the terraces, while later Pueblo sites are found on both the terraces and lake bottoms. Some of the lakes, however, had dried up, for Folsom Man hunted in the bottom of a lake basin at the northeast end of the Plains. Critical to the dating is whether the Gypsum-Pinto entrance was following the Great Pluvial of about 10,000 years ago or the Little Pluvial of 2000 to 1000 B.C. Judging by evidence from other areas, if it were at the time of the Little Pluvial Folsom Man may have lingered much longer than generally supposed.

The next group to enter the Plains bear some relationship to the San Pedro complex of the Cochise, early Phases of the Mogollon, and Basket Maker. These were probably responsible for the introduction of long corner-notched and new types of side-notched points. Whether they supplanted the Pinto-Gypsum-Manzano hunters or not cannot be ascertained, although

[170] *Ibid.*, Fig. 41.
[171] *Ibid.*, p. 103; Loud and Harrington, 1931, pp. 120–1.
[172] *Ibid.*; *ibid.*
[173] Rogers, 1939, Pl. 13, pp. 53–4.
[174] Campbell, and Campbell, 1935, Pl. 13, pp. 46–51.
[175] Bryan and Toulouse, 1943, pp. 278–80.
[176] Kelley and others, 1940, p. 146.
[177] Sayles and Antevs, 1941, p. 8.
[178] Rogers, 1939, p. 52.
[179] Harrington, 1933, pp. 84–5.

they may have mixed with them. The last period of history brings in the Early Pueblo horizons with pottery. By then conditions must have been very similar to those at present. Some of these latest inhabitants camped on the better drained terraces and others by water holes in the lake bottoms. The area did not prove too attractive, however, for only a few small camp sites are found in the lake bottoms proper and on their terraces.

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THE POTTERY OF THE GALLINA COMPLEX

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SEVERAL problems arising from the very interesting ceramic wares of the Gallina[1] area have already appeared in print. H. P. Mera[2] has admirably described the various potteries of this region and made certain suggestions concerning their origin. The utility vessels[3] of the Gallina have attracted special comment and have figured more than any other one feature in discussions of the cultural origin of the whole complex. Several additional seasons of field work in this area have, however, added a number of new items to the picture sufficient, perhaps, to color final conclusions.

The pottery of the Gallina quite naturally divides itself into two major varieties. These are the utility wares and the decorated wares. The dichotomy between the two transcends the ordinary division of usage. The decorated ware and the utility pottery of this complex seem to derive from two separate origins and traditions. Further to bring out these differences, a large bulk of tabulated sherds numbering some 200,000 pieces from seven excavated sites were examined critically for additional data. On this basis the various pottery types may be tabulated briefly as follows:

GALLINA BLACK ON GRAY

Paste:

Color: Medium gray to light gray. Rarely a dark core. Occasional olive green cast in bowl forms.

[1] Mera, 1937; Hibben, 1937.
[2] Mera, 1935, pp. 8–11.
[3] *Idem*; Hibben, *Ibid.*

Inclusions: None. Fine homogeneous paste.
Texture: Temper, grit of fine quality. Ground mass cryptocrystalline. Texture, dense and non-friable.
Fracture: At right angles to surface, regular.
Hardness: 4.5 to 5.
Surface features:
Color: Same as paste; orange when overfired.
Hardness: 5.
Evenness: Smoothed and regular. Bottom portions usually less evenly prepared. Scraping striations on the interior.
Texture: Slightly gritty to touch, especially on the interior of vessel.
Luster: Slight. Dull matte in many cases.
Slip: Same as clay. Apparently absent in some cases.
Defects: Poor bonding of coils on necks of small mouthed ollas.
Firing atmosphere: Reducing. Overfired only in burned houses.
Thickness: 3–6 mm.
Construction: Coiled and bonded. Walls thinned by scraping. Effects of scraping obliterated on exterior.
Form: Large ollas and water jars, small olla forms with lugs, bowls of small size (Fig. 46).

FIG. 46. Gallina Black on Gray bowl forms.

Modifications: Vertically perforated lugs. Bizarre forms in "submarine," elongated assymetrical, and phallic forms.
Measurements:
Height: Maximum, 35 cm.; minimum, 9 cm.
Diameter at mouth: Maximum, 19 cm.; minimum, 3.5 cm.
Diameter at widest point of body: Maximum, 34 cm.; minimum, 6 cm.
Capacity: Maximum, 4000 cc.; minimum, 50 cc.
Techniques of decoration: Carbon paint, applied in lineate designs, solid figures, and hour glass patterns. Polish over paint (Figs. 47–50).

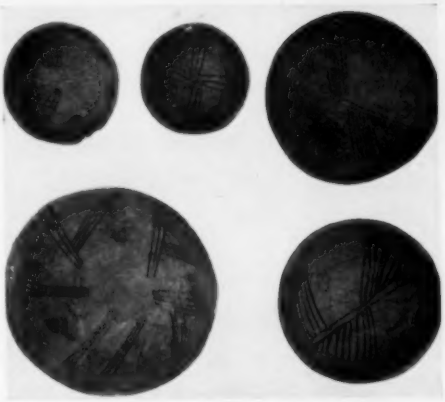

FIG. 47. Gallina Black on Gray bowls.

Analysis:
Hand section: Gray, fine grains in light brown cryptocrystalline matrix. Homogeneous and evenly fired.
Thin section (horizontal): A "pseudo" alignment of ground mass around larger quartz and feldspar particles.

GALLINA BLACK ON GRAY OVERFIRED

Analysis:
Hand section: Absence of white grain texture. Light orange.
Thin section (vertical): Eddy currents in ground mass are noticeable. Color is light yellowish-brown to orange in cryptocrystalline mass. Oxidized and fused in places. Brownish grains around which are flowage lines and partially fused portions. The following characteristics may be noticed: (1) absence of alignment; (2) absence of angular large grains; (3) brown rounded grains which represent the result of heat, with the water of crystallization partially driven off and fusion of the mass beginning; (4) ground mass which is somewhat spongiose.

GALLINA PLAIN UNDECORATED

Paste:
Color: Light to dark gray with blotching of dark brown stains on outside. Inside regularly even gray.
Inclusions: None; finely mixed paste.
Texture: Temper, grit of fine quality in cryptocrystalline ground mass. Fine texture, dense, and non-friable.
Fracture: Quite regular, at right angles to the surface. Fragments possess angular outline. Edge slightly rough.

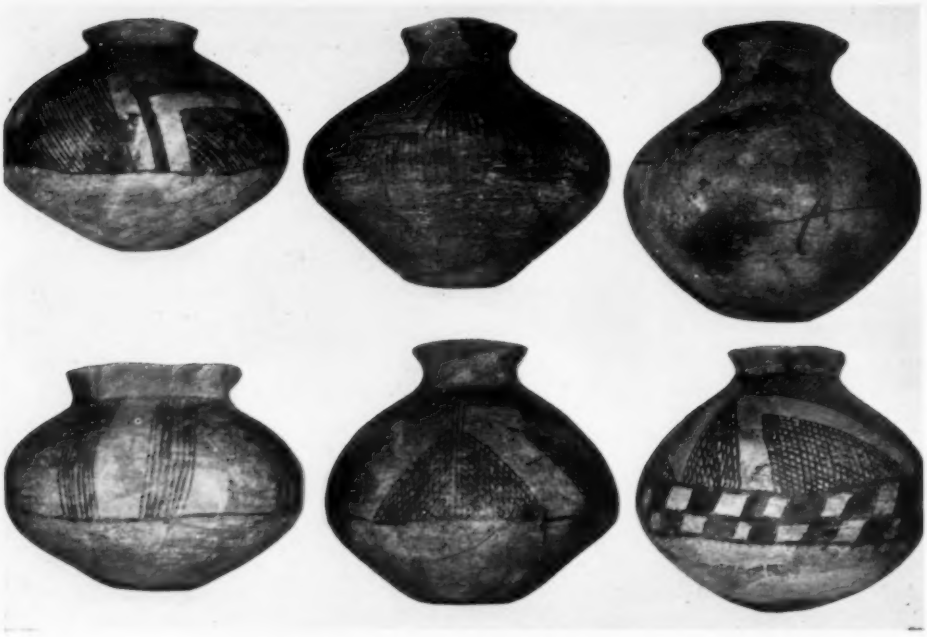

FIG. 48. Gallina Black on Gray ollas.

Surface features:
Color: Same as paste.
Hardness: 5.
Evenness: Shallow depressions such as are resultant from paddle and anvil finish. Interior shows no scraping. Occasional scraping striations on neck region of vessel interior.
Texture: Slightly gritty to touch, with fine inclusions.
Luster: Slight. Not polished as finely as painted ware.
Slip: None.
Defects: Occasional inadequate bonding of coils.
Firing atmosphere: Reducing. Occasional pieces overfired, in burned houses, to orange shades.
Thickness: 4–6 mm.
Construction: Pseudo (i.e., broken) coiling spirally applied. Basal portions ordinarily thinned by paddle and anvil.

FIG. 49. Gallina Black on Gray olla in place on floor of a unit house. Murals appear on the wall behind.

FIG. 50. Small decorated olla (Gallina Black on Gray) with adobe plug in place.

Form: Small ollas, narrow mouthed jars, bowls. Few large forms.
Modifications: Solid and perforated lugs, occasional fillet rims, long handles of parallel rolls of clay rare.
Measurements:
Height: Maximum, 13 cm.; minimum, 7 cm.
Diameter at mouth: Maximum, 6.5 cm.; minimum, 4.5 cm.
Diameter at widest point of body: Maximum, 12 cm.; minimum, 6 cm.
Capacity: Maximum, 600 cc.; minimum, 50 cc.
Techniques of decoration: None additional to polishing, perforation, and filleting.
Analysis:
Hand section: Gray, hard (clay-slate type).
Thin section (horizontal): Inequigranular; coarse fragments in a fine grained brownish cryptocrystalline ground mass. The matrix seems to show flowage in places due to: (1) heat application; and (2) hand molding before heat, possibly bringing about alignment of finer particles.

GALLINA PLAIN UTILITY

Paste:
Color: Gray to dark gray. Center often very dark.
Inclusions: Occasional quartz pebbles as large as thickness of wall.
Texture: Gritty to touch, coarse but homogeneous. Temper coarse grit, predominantly quartz.
Fracture: Irregular but not jagged.
Hardness: 3 to 4.

FIG. 51. Gallina Plain Utility (pointed bottom) vessels.

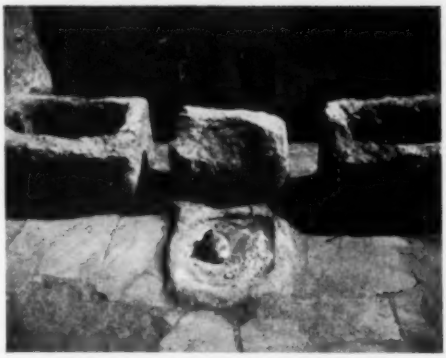

FIG. 52. Gallina Plain Utility (pointed bottom) vessel in place in a fire pit of a tower.

Surface features:
Color: Same as paste; much fire blackening on exterior. Sparkle in most sherds from muscovite flecks.
Hardness: 3 to 4.
Evenness: Exterior even but not scraped. Interior shows depressions from paddle and anvil. Neck region smoothed by wiping wet clay often in wide corrugations. Necks of larger vessels often coiled and coils bonded flat, but visible interior and exterior.
Texture: Gritty, but inclusions paddled into surface.
Luster: Dull; light reflects only from flecks of muscovite and fractured quartz fragments.
Slip: None.
Defects: Pits caused by falling out of pieces of coarse temper. Occasional sherds fused and vitrified by overfiring.
Firing atmosphere: Always reducing. Accidental overfiring in burned houses produces red and yellow tones.
Thickness: 3–8 mm.
Construction: Coiling and thinning with paddle and anvil method. Coils often left on neck in washboard effect or as flat coils.
Form: Pointed or semi-pointed bottoms (conical); body of vessel cylindrical with greater or less bulge to sides. Constriction at neck not pronounced; orifice wide. Also squat wide-mouthed forms of large size with indented bottoms. Small forms with flat bottoms and wide mouths (Figs. 51–2).
Modifications: Fillets on or just below rims. Lugs in the form of human mammae.
Measurements:
Height: Maximum, 42 cm.; minimum, 10.5 cm.
Diameter at mouth: Maximum, 23 cm.; minimum, 7.8 cm.
Diameter at widest point of body: Maximum, 33 cm.; minimum, 9.5 cm.

Capacity: maximum 4500 cc.; minimum 300 cc.
Techniques of decoration: Striations sometimes on exterior, rarely on interior; these formed with short strokes of either a corncob without kernels or a jagged stick (Fig. 53). Occasional pinching with fingers in wet clay in rows or designs. Also fingernail marking in designs.

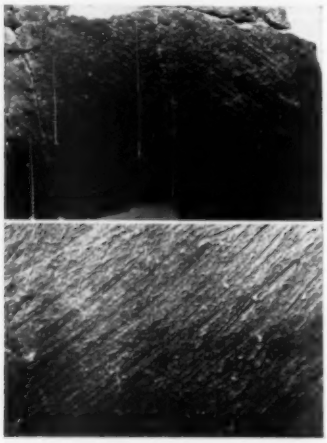

FIG. 53. Typical striations on surfaces of Gallina Plain Utility (pointed bottom) vessels.

Analysis:
Hand Section: Coarse-grained material. Texture similar to a medium-grained sandstone.
Thin section (horizontal): (1) Mixture of rounded and fragmental quartz and feldspar with quartz predominating. The rounded grains are majority quartz. Material probably from a stream bed; not well sorted. Quartz grains show "strain" extinction. (2) Ground mass shows no alignment; brown in color. Main feature of specimen is the coarse nature, and lack of solid embedding.

GALLINA COARSE UTILITY

Paste:
Color: Medium dark gray to very dark gray. Core often darker than cortex.
Inclusions: Often large quartz pebbles, and coarse fragments of quartz and feldspar.
Texture: Coarse and gritty.
Fracture: Irregular, jagged, and crumbly.
Hardness: 3.
Surface features:
Color: Same as paste, often fire blackened.
Hardness: 3.
Evenness: Rough and gritty but generally fairly even surface. Sloughing off of surface usually obscure; regular scraping marks.
Texture: Gritty and crumbly.
Luster: Earthy.
Slip: None.
Defects: Poor firing often produces crumbling or poorly consolidated patches. Large temper contributes to poor bonding.
Firing Atmosphere: Reducing, in some cases almost a *bucchero.*
Thickness: 5–8 mm.
Construction: Coiling and scraping. No paddle and anvil finish.
Form: Usually wide mouthed, squat, flat, or indented bottom jars; some partially conical bottom pieces.
Modifications: Usually none; plain.
Measurements:
Height: Maximum, 38 cm.; minimum, 16 cm.
Diameter at mouth: Maximum, 22 cm.; minimum, 9.5 cm.
Diameter at widest point of body: Maximum, 28 cm.; minimum, 10 cm.
Capacity: Maximum, 3000 cc.
Techniques of decoration: None.
Remarks: This ware is a coarser variety of the regular Gallina Utility ware. It is readily distinguishable, especially in thickness of wall, shape, and mode of thinning.
Analysis:
Hand section: Dark, coarse, crumbly paste. Core darker and less highly fired than cortex.
Thin section: Major characteristics include: (1) spongiose, dark coarse ground mass; (2) large angular fragments of quartz temper poorly bonded; (3) pores and openings in ground mass and around temper particles; (4) effects of uneven firing; (5) no flowage or alignment of ground mass as in other wares.

GALLINA PLAIN UNFIRED

Paste:
Color: Light brown to gray.
Inclusions: None.
Texture: Soft, slightly gritty to touch.
Fracture: Fairly even and smooth.
Hardness: 1 to 2.
Surface features:
Color: Same as paste; sometimes fire-blackened on exterior.
Hardness: 1 to 2.
Evenness: Surface indented from paddle and not scraped.
Texture: Slightly gritty.
Luster: None.
Slip: None.
Defects: None; walls extremely friable because of softness.
Firing atmosphere: None.
Thickness: 10–20 mm.
Construction: Molded and thinned with paddle and anvil; no coiling.

Form: Small forms only; seed jars, small jars, narrow-necked elongated jars.
Modifications: Often addition of two lugs close together so as to suggest mammae.
Measurements:
Height: Maximum, 10 cm.; minimum, 6 cm.
Diameter: Maximum, 9 cm.; minimum, 4.5 cm.
Capacity: Maximum, 200 cc.
Techniques of decoration: Thumbnail incisions in groups and alignments.
Remarks: A thin section is not feasible for this ware. That this is not just an unfired variant of the other wares is evidenced by the typical shapes and the numbers of vessels of this type accompanying each Gallina house.

GALLINA PUNCHED WARE

Paste:
Color: Gray, with large fire scar areas of light brown.
Inclusions: None.
Texture: Granular but fine. Temper, fine grit, but prominent in quantity.
Fracture: Jagged.
Hardness: 4.5.
Surface features:
Color: Same as paste; glistening particles of muscovite mica.
Hardness: 4.5.
Evenness: Indentations from paddle and anvil thinning. Surface scraped with rough corncob finish with strokes in different directions.
Texture: Rough from scraping and gritty.
Luster: Dull. Only flecks of muscovite sparkle. These are not thickly spaced.
Slip: None.
Defects: Poor bonding of coils in base of vessels.
Firing atmosphere: Reducing, with fire scars.
Thickness: 4 mm.
Construction: Coiling and paddle and anvil.
Form: Olla.
Modifications: None.
Measurements:
Height: Maximum, 28.5 cm.
Diameter at mouth: Maximum, 13 cm.
Diameter at widest point of body: Maximum, 30 cm.
Capacity: 4000 cc.
Techniques of decoration: Punching with the end of a stick in lineate designs over corncob striations.
Remarks: This type is apparently rare. There is only one complete vessel in the collection.

GALLINA ROUGH UTILITY FUSED (OVERFIRED)

Analysis:
Hand section: Spongiose, with bursts.
Thin section: Characteristics include: (1) air spaces left between masses; (2) heat effect on hydrous minerals; (3) gas explosion during heat; (4) same type of grains left in temper, indicating fusing of ground mass only. The whole fabric of the pottery is reduced to a spongy porous mass which has been enlarged and warped by gas bursts out of its former shape and size. The whole has taken on a glassy, glistening appearance which readily distinguishes it from basalt or lava forms. Most of the so-called finds of maize imbedded in lava are of this category.

On the basis of these data, the first large grouping, i.e., the decorated wares, appear to be in a class by themselves. In general these decorated ceramics lie well within the general Pueblo tradition. So much is this the case that Mera felt justified in stating that the entire Gallina complex was derived from some Chacoan stem in the San Juan region.[4] A number of features support the contention that Gallina painted wares are Chacoan or at least Puebloan in general character. Design elements on Gallina ollas may be paralleled in such collections as those at Aztec, New Mexico. Other design features such as ticked rims, multiple framing lines, and solid hourglass figures, are reminiscent of Mesa Verde. As the Gallina painted pottery is decorated with carbon paint, this would indicate even stronger Mesa Verde connections. Whatever the exact provenience of the Gallina decorated wares might be, there is no doubt that they are a part of some aspect of the Pueblo pattern.

It is the utility wares of the Gallina that do not fit into such a Pueblo theory of origin. Their shape and manufacture both appear foreign to the area.

The manufacture of Gallina utility wares is normally by coiling on a formed base. The coils are often left unobliterated on the necks and upper portions of vessels, and a washboard treatment is standard. The lower portions of utility pots are, however, thinned by the paddle and anvil technique.[5] It is this latter which is an unusual feature in any Puebloan complex.

The shapes of utility wares are perhaps the most unusual of all Gallina features. These vessels are universally conical-bottomed. The outlines vary from sharply pointed bases to others of truncated cone shape. Some vessels taper to a rounded, double curvilinear point. Other specimens have a more angular outline. In addition to the conical-bottom shape, the Gallina utility pots are decorated with fillets

[4] Mera, 1935, p. 8.
[5] Fewkes, 1941, p. 162.

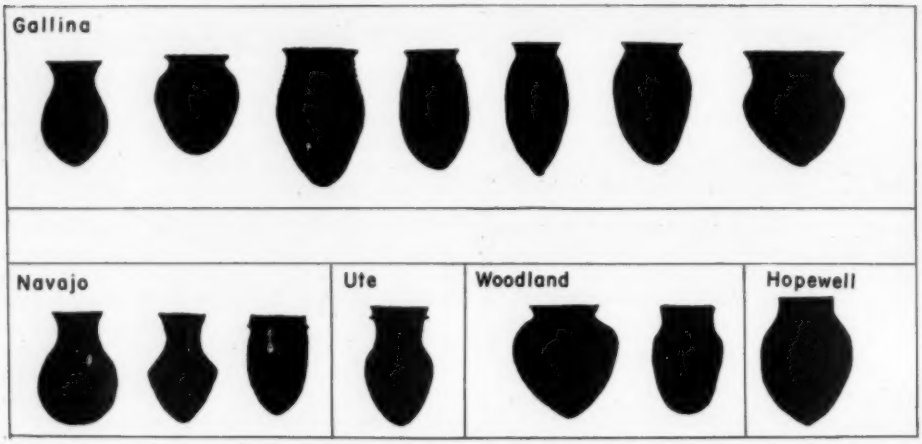

FIG. 54. Gallina Plain Utility (pointed bottom) forms and some comparative types.

just below or on their edges. The fillet is not complete around the rim. A "spirit opening" is left as a gap. The feature of the fillet also departs from Pueblo usage.

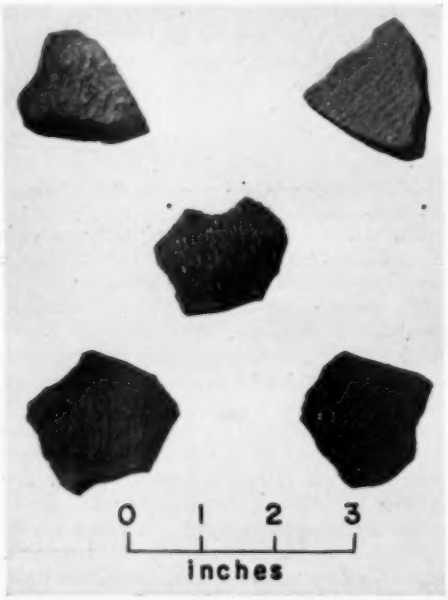

FIG. 55. Trade sherds found at Gallina sites. The uppermost two sherds are "maize marked." These two were found on the floor of the unit house at Cuchillo. The other three are cord-marked sherds from Cerrito.

The non-decorated wares of the Gallina complex suggest other than Pueblo connections. Among such possibilities we may suggest the following:

1. A connection with the Navajo.
2. Woodland contact or origin.

The first of these alternatives was suggested by Mera[6] when he first made a survey of these sites. Many Gallina vessels closely resemble Navajo pieces feature for feature. The shape, the fillet, the "spirit opening" in the fillet, even a technique of surface striation in both Navajo and Gallina, argue for some connection.

As the series of ascertained dates in the Gallina now runs from the early twelfth to the late thirteenth centuries, it would seem obvious that Navajo influence in the matter of pottery must have been from the Gallina. There is a possibility that the incoming Navajo found some Gallina peoples still extant in this area and absorbed this pottery trait from them. The Navajo have proved themselves sufficiently eclectic in other matters. There is, too, the possibility that the Navajo may have picked up tower building[7] from this same source.

The second of the obvious possibilities as to Gallina connections is also suggested by ceramics. The striated surface treatment of Gallina utility pots suggest, in some examples, a cord-marked surface. The conical-bottomed

[6] Mera, 1935, p. 10.
[7] Hibben, 1948.

vessels strengthen such considerations and seem to point in a Woodland direction. Many varieties of Woodland pottery exhibit conical and pointed-bottomed forms although seldom identical with those of the Gallina (Fig. 54). Any pointed-base form is usually pronounced Woodland, especially if the surface is cord marked as well.

In discussions of cultural affinities, trade items are, in most cases, invaluable criteria. In the Gallina complex, however, such trade pieces are almost wholly lacking. Even the usually prevalent alien potsherds are scarce to absent in the Gallina. So much so is this the case that it heightens the impression of isolation in this area. Mera, in all of his surveys, found only three non-indigenous sherds in his Gallina collections.[8] One of these was a Chaco 2 piece; another, a fragment of Santa Fe Black on White; and the third was a sherd of the Mesa Verde series.

In the University of New Mexico excavations at Cerrito, six cord-marked sherds were recovered from the floor of House VI (Fig. 55). These, although difficult of exact identification, are closely allied to Woodland types from western Nebraska and eastern Colorado.[9] Because of their possible interest in this Southwestern location, the two principal types represented are described below:

EASTERN COLORADO WOODLAND CORD-MARKED

Paste:
Color: Dark gray.
Inclusions: None. Temper coarse and rounded quartz.
Texture: Coarse.
Fracture: Jagged and rough.
Hardness: 4.
Surface features:
Color: Same as paste; exterior sometimes brownish.
Hardness: 4.
Evenness: Indentations resulting from paddle and anvil thinning. Surface marked by cord-wrapped paddle and in some cases subsequently wiped.
Texture: Slightly gritty.
Luster: None.
Slip: None.
Defects: Extrusion of temper on surface. Walls thinned too much in places by paddle and anvil.
Firing atmosphere: Reducing, with differentiated core of poorly fired material.
Thickness: 3–6 mm.
Construction: Paddle-and-anvil thinned. Walls of vessels thickened in places by addition of thin slabs of clay beaten in.
Form: Apparently rather round-bellied, pointed-bottom pots with slightly everted rims.
Modifications: None.
Measurements: Unknown.
Analysis:
Hand section: Coarse temper inclusions poorly bonded in comparatively fine paste.
Thin section: (Because of the friable nature of this ware a satisfactory thin section was extremely difficult to make.) The section shows the following characteristics: (1) large, rounded quartz masses; (2) ground mass of irregular composition with some air spaces; (3) ground mass showing alignment.
Conclusions: The Gallina specimens and those from eastern Colorado sources are essentially the same. The above description applies to both equally with only small variants such as differences in clays used for the ground mass.

EASTERN COLORADO MAIZE-MARKED (WOODLAND?)

Paste:
Color: Light red-brown.
Inclusions: None. Temper, quartz sand.
Texture: Sandy.
Fracture: Uneven rather than jagged.
Hardness: 4.
Surface features:
Color: Same as paste.
Hardness: 4.
Evenness: Indentations resulting from the paddle-and-anvil thinning technique. Surface marked with kerneled cob of maize, which was used as a paddle.
Texture: Grainy and sandy.
Luster: None.
Slip: None.
Defects: Walls thinned too much in places. Flat slabs added and pounded in.
Firing atmosphere: Reducing, with areas of over-fired and oxidized reddish-brown.
Thickness: 6–7 mm.
Construction: Paddle-and-anvil thinned.
Form: Pointed-bottom, wide-mouthed jars; rims almost straight and only slightly thickened.
Modifications: None.
Measurements: Unknown.
Analysis:
Hand section: Porous with coarse sandy but homogeneous paste.
Thin section: Characterized by: (1) rounded quartz fragments; (2) coarse sandy ground mass; (3) little cryptocrystalline mass; (4) porous bonding of temper fragments and ground mass; (5) no alignment or "flow lines"; (6) feldspar, muscovite, hornblende, and olivine in the sandy temper.

[8] Mera, 1935, p. 10.
[9] Renaud, 1931.

Conclusions: A single sherd of this ware from the Gallina is apparently identical with specimens collected in eastern Colorado.

At first blush, this cord-marked material might seem out of place in New Mexico. However, recent developments along these lines have shown a remarkable extension of potteries of Woodland affinity. McKern[10] has postulated an Asiatic origin for the whole Woodland culture pattern. In his arguments he has traced Woodland pottery from Alaska to eastern Colorado. McKern[11] also suggests a western center of Woodland development—an especially interesting theory in light of the Gallina location. Even more recently Griffin and Krieger[12] have described cord-marked and fabric-impressed ceramics from central Mexico. Closer to the area in question, Krieger[13] has found similarly cord-marked sherds in the Panhandle area of Texas. Many other instances might be quoted of the widespread occurrence of cord-marked and otherwise Woodland-like pottery. These few examples will suffice, however, to indicate that sherds of this nature are perhaps not so out of place in the Gallina complex.

Woodland affinities so strongly suggested by the conical-bottomed shape of the Gallina utility vessels and augmented by the occurrence of trade sherds of cord-marked ware, quite naturally bring up the question of a Woodland origin for the Gallina peoples. Certain other features of the Gallina complex add to such a supposition. For example, the architectural features, the great use of bone and antler, chipped knives, and clay pipes of non-Pueblo forms, as well as the physical type of the Gallina people themselves, all seem to argue for a non-Southwestern or, at least, non-Pueblo origin for the Gallina complex.

Caution must be employed, however, in accepting such a conclusion. The Gallina decorated pottery argues against a Woodland origin. The very fact that the Gallina people employed stone masonry in architectural forms would be a Puebloan connection, no matter how different these forms might be. As for the provocative question of conical-bottomed Gallina pots, there are other possible connections in addition to Navajo and Woodland. Pointed-bottomed vessels occasionally occur among the Zuni and Hopi. There is a single example from Pueblo Bonito in Chaco Canyon and another has been found in the Piedra district of Colorado. There is even the possibility of Great Basin affiliations on the basis of this trait alone.

In the future, if purely objective lines of reasoning are followed, the clues offered by the pottery of the Gallina complex may lead to the elucidation of the whole complex.

[10] McKern, 1937.
[11] *Idem*, p. 140.
[12] Griffin and Krieger, 1947.
[13] Krieger, 1946.

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EXCAVATION OF TOMMY TUCKER CAVE, LASSEN COUNTY, CALIFORNIA

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THE following is a brief account of the partial excavation of a cave on the east side of Honey Lake Valley, near Wendel in Lassen County, California.[2] Although the materials recovered are not extensive, these notes seem warranted by the fact that this is the only dry cave archaeology done south of Oregon on this extreme western periphery of the Great Basin. Ninety miles to the east, work has been done in Lovelock Cave[3] and Humboldt Cave.[4] Some 150 miles north of our area the University of Oregon, under the direction of L. S. Cressman, has devoted nearly seven years (1935–42) to excavating the dry caves of south-central Oregon.[5]

Honey Lake is the remnant of the westernmost arm of extinct Lake Lahontan. Its surface is 3,950 feet above sea level at the present time. The lake is bounded on the northeastern corner by Hot Springs Peak, a mountain of Miocene volcanics. Tommy Tucker Cave, *circa* 200 feet above the valley floor, is a fissure on a fault line near the foot of this peak. It is two miles east of the present lake shore, the closest permanent water. Perhaps more accessible than the lake shore is a group of active hot springs at Amadee, two and a half miles to the southwest, or a similar group near Wendel, three miles to the northwest.

The site is in territory occupied within historic times by a Northern Paiute band called the Wadadökadö.[6] The large peninsula which juts into Honey Lake fifteen miles to the southwest is frequently ascribed to the Washo; a similar distance to the west the Maidu held the western shores of the lake.

The general trend of the cave is north and south, i.e., parallel rather than at right angles to the face of the mountain. Because of this, the cave cannot be seen from the valley floor. A narrow shelf runs along the bluff face at the level of the cave mouth and from this shelf a talus slope drops for 150 feet so sharply that ascent and descent are very difficult.

Tommy Tucker Cave consists of two chambers connected by a narrow passage. The larger and foremost of these is 45 feet long, 20 feet wide, about 12 feet high, and is extremely irregular in outline. This complete area was excavated to a depth of 40 inches. At no point was the original floor reached.[7] The north wall and the roof are composed of crumbling volcanic breccia; the south wall, of a much more durable andesite. The roof and considerable portions of the cave walls are covered with a 4-inch thick layer of calcareous tufa, presumably laid down when Lake Lahontan covered the cave.

The ceiling of the cave is heavily coated with soot. No true strata were observable, but lenses of charcoal and straw were present. The human deposit in the cave covered the entire floor, extending to as great a depth as we reached anywhere in our excavations. It consisted of an extremely dusty admixture of ordinary camp refuse material with gravel (constantly crumbling from the breccia ceiling) and bat guano. The fact that these last two materials did not

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[1] This paper is one of a collection of manuscripts assembled for the California Archaeological Survey under the title of "An Archaeological Survey of Lassen County, California."

[2] The first excavation was carried on during two weeks of August, 1940, by Harry and Francis Riddell. In January, 1942, Richard K. Beardsley and the authors spent an additional ten days at this site. The materials described are in the Museum of Anthropology, University of California. The cave is named for a Maidu Indian World War I hero, a native of Lassen County.

We are indebted to Mr. Adan Treganza for preparing the drawings of the sandals, the bone artifacts, and the projectile points; to Dr. L. S. Cressman, of the University of Oregon, for examining and aiding in the description of the basketry and sandals; to Drs. Alden H. Miller and Harvey Fisher, of the University of California Museum of Vertebrate Zoology, for identifying the mammalian and avian remains; to Mr. Clement Meighan for preparing the photographic plate; and to Dr. Herbert L. Mason, of the University of California Herbarium, for identification of botanical remains.

[3] Loud and Harrington, 1929.

[4] Heizer and Krieger, n.d.

[5] Cressman, 1942; also Cressman, 1936 and 1940.

[6] Stewart, 1938; Stewart, 1939.

[7] A plat of the cave floor was prepared and objects of interest were located in reference to a datum, a plane, and an excavation block. These data are not presented in detail here but are summarized in the concluding paragraphs.

occur in layers or lenses perhaps indicates that the occupation of the cave was relatively continuous.

Shortly before our first visit to the site a mining claim was filed upon it by the nearest resident, a Mr. Hellman. To him we are indebted for the opportunity of examining several artifacts which he had previously picked up on the surface of the cave floor and for a description of a rock wall which formerly blocked the greater portion of the entrance. According to his description, a dry wall, composed of flat rock slabs piled to a height of 3 or 4 feet, extended from the northern edge of the cave mouth to within 3 feet of the southern edge. At the time of our visit there was some evidence of the wall in the form of scattered stone slabs, mostly composed of calcareous tufa which had sloughed off, or been broken from, the cave wall.

Among the objects which Mr. Hellman found on the surface of the deposit inside the cave was a crudely made iron knife, 8 inches long, apparently worked cold from an appropriately sized sheet by hammering and grinding. A short section of the proximal end had not been worked to an edge, and this was the only provision for a handle. There were also a mandible of a domestic sheep and a number of wood chips which seem to be the product of chopping with a metal axe. These are the only objects found which indicate post-contact utilization of the cave. They may, of course, be attributed to Caucasians or to Indians in the period since 1850.

Pictographs. On the southeast wall (i.e., right-hand side as one enters), near the mouth of the cave, there is a smooth area 8 feet long and 4 feet high which is devoid of calcareous tufa. This space is decorated with a series of pictographs. The paint used is for the most part a dull dark red (probably hematite), but three groups of parallel vertical lines are done in orange (perhaps also an oxide of iron), and three long horizontal lines are painted in white. Most of the figures are too indistinct to permit accurate description, but zigzag lines, rows of dots, and a circle enclosing a cross were recognized.[8]

Pointed twigs. Of the types of artifacts found, by far the most numerous were wooden twigs broken off at one end and sharpened at the other. The total number of specimens recovered was 843. Of these approximately 90 per cent are of peeled sagebrush, the remainder of various woods. The length extremes of complete specimens are 9 cm. and 45 cm., but over 60 per cent fall between 17 cm. and 25 cm. in length. Diameters range from 4 mm. at the base and 2 mm. at the point to 8 mm. at the base and 6 mm. at the point. Most of the sharpened points are polished and striated longitudinally, apparently because their function entailed their being repeatedly thrust into the ground. Only one specimen shows any other special features; No. 1-74793 has been wrapped thrice with a 2-strand cord of sinew, the ends of which are tucked under the wrapping; the whole twig, except for 5 cm. of its point, is stained with red ocher. The function of these twigs is uncertain. They have never before been described in Great Basin archaeology. It is possible that they served as counters in the hand game or some other gambling game. They are much more carelessly made than ethnographic specimens from this area and they show no evidence of having been of uniform lengths.[9] The large number of these sharpened twigs is puzzling. They were more numerous toward the walls of the cave. Seven hundred were found in the upper 20 inches of the deposit, whereas only 143 occurred in the lower 20 inches.

Cane dice. Twenty-seven pieces of split cane, cut off at each end, were found. All but one of these are of *Phragmites communis*, the single exception being of a pithy wood, perhaps elder (*Sambucus sp.*). They vary in length from 20 mm. to 117 mm., but 24 specimens fall between 40 mm. and 80 mm. in length. Widths vary from 5 mm. to 13 mm. Most of the specimens are cut from sections of cane between nodes; a few include a joint. None is decorated in any manner. The majority of the specimens (23) were found between the depths of 20 inches and 40 inches in the deposit. They may be either dice or game counters.[10] Three unsplit sections of cane may have had a similar function. These measure 40 mm., 45 mm., and 93 mm., respectively, and the shortest includes a node.

Cane awls. Seven pointed implements of relatively coarse, heavy pieces of cane resemble awls. It seems unlikely that they had the func-

[8] Drawings and photographs of the pictographs are on file, but more detailed description is held for a final report.

[9] Cf. Culin, 1907; especially p. 333 and Fig. 441.

[10] Cf. Culin, 1907, p. 167 and Fig. 206. Also Steward, 1937, pp. 23–4 and Fig. 6.

tion of bone awls. Whole specimens range in length from 60 mm. to 90 mm. The concave surface of one specimen (No. 1-74776) is stained with red ocher. A second (No. 1-74777) is decorated with fourteen incised transverse lines spaced 1.5 mm. apart, which extend distally from the point on the convex surface.

cm. long. The bark has been removed and the specimen is somewhat polished. It has been burned off at one end and cut off squarely at the other. On each side of the shaft, 30 mm. below the cut-off end, is a broad, shallow, roughly made notch. Both specimens were found between 20 and 40 inches deep.

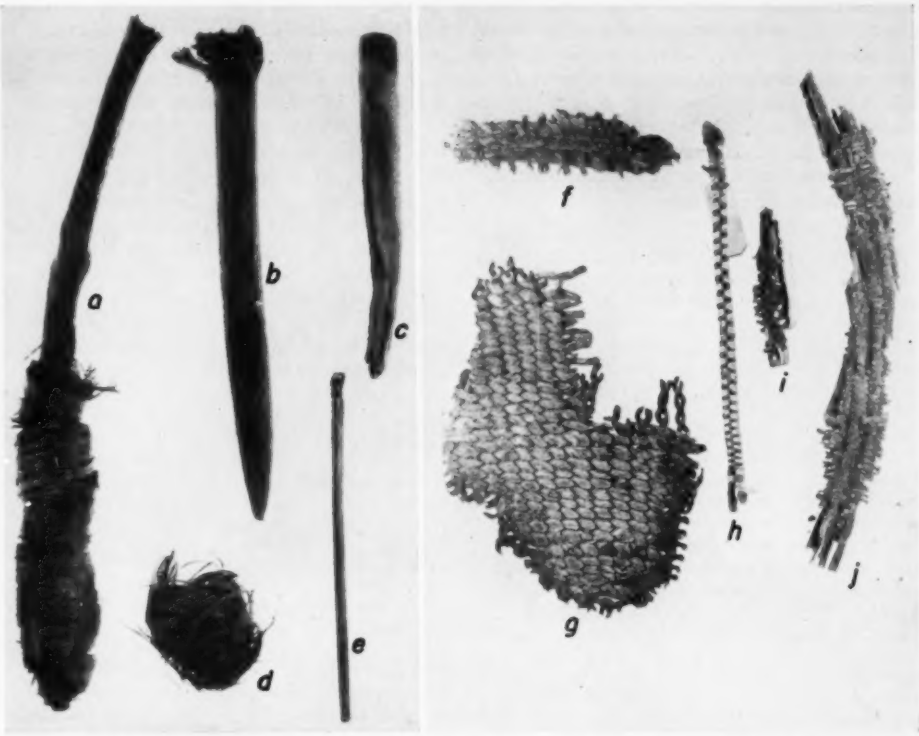

FIG. 56. Perishable artifacts from Tommy Tucker cave, California: *a*, bark-wrapped stick; *b*, hammered peg; *c*, fire drill foreshaft; *d*, bundle of obsidian flakes wrapped in sage-brush bark; *e*, miniature arrow; *f* and *g*, twined basketry fragments; *h*, quill braid; *i* and *j*, coiled basketry fragments.

Digging sticks. Two fragments of what may have been digging sticks were found. One (1-74809) is of willow, round in cross section, measuring 17 mm. in diameter and 32 cm. in length. The bark has been removed and the specimen is well worn from use. It has been broken off at one end and the other end has been brought to a point by a long bevel from one side. The second specimen (1-74810) is of greasewood, flat in cross section, measuring 20 mm. wide, 8 mm. thick, and, at present, 30

Fire drill fragment. There is one fragment of a fire drill (1-81599). It has one rounded, polished, fire-blackened point and is broken off at the other end. The material is sagebrush wood (Fig. 56, *c*).

Pine nut shell beads. Five beads made from the nut shell of the digger pine (*Pinus sabiniana*) were found. Three specimens (1-74707, 74708, 74709) have been fashioned by grinding off each end of the nut at right angles to its long axis. The other two (1-74705 and 1-74706) have

one end ground off at an obtuse angle to one face, and a perforation ground into the face thus shortened. This record fills a hiatus in the known distribution of the artifact type.[11]

Basketry. In striking contrast to most Great Basin caves, our site yielded only four small fragments of basketry. Since conditions for its preservation were optimum, its absence can be explained only on cultural grounds. It is apparent that few baskets were discarded at this site because of wear, and the absence of complete specimens is probably explained by our failure to find cache pits or burials. For the following description of the basketry we are indebted to Dr. L. S. Cressman, who examined the specimens and compared them with his material from southern Oregon.

1-74843. Fragment of flexible plain twined basketry, warp of two-ply twisted tule, weft of tule. The pitch of the stitch is down to the right. New warps are added by simple insertion and trimming the end flush with the surface. There are 13 warps and 22 wefts per 5 cm. The decoration consists of wrapped twined overlay and plain twine overlay visible on both surfaces, evidently using both one and two strands. These, wrapped twined overlay and one strand, are used in the same row, apparently to produce a type of beading. A zone of decoration is present at the upper edge of the specimen; a second zone, five weft rows wide, is seen nine rows below this; and two or three rows of plain twined overlay occur seven rows below the second zone. The worn and macerated condition of this fragment makes more accurate description of the decoration impossible (Fig. 56, *g*).

1-74844. Fragment of plain twined basketry. Foundation is similar to 1-74843 but the elements are somewhat more rigid. There are 14 warps and 18 wefts per 5 cm. The entire fragment is covered by a two-strand overlay, visible on both surfaces (Fig. 56, *f*).

1-74845. Fragment of coiled basketry, three-rod triangular, with stitch passing under top rod. Stitches are split on one side. There are *ca.* 12 coils and *ca.* 35 stitches per 5 cm. Apparently the piece was pitch covered. The direction of the work is to the left, but the work surface is indeterminable (Fig. 56, *i*).

1-74846. Fragment of coiled basketry, three rod triangular, with top rod split by stitch. Rods are fairly even in size. The stitch is plain. There are *ca.* 15 coils and *ca.* 32 stitches per 5 cm. The specimen seems to be pitch covered. The direction of the work is to the left, but the work surface is indeterminable (Fig. 56, *j*).

[11] Cf. Heizer, in Cressman, 1942, Fig. 71.

The two specimens of flexible twined basketry are similar in every way to one type of twined basketry from Lovelock Cave,[12] and are described by Cressman[13] as "good Catlow Cave twine." They are also similar to modern Achomawi, Atsugewi, and especially Klamath flexible twined basketry. The specimens of coiled ware resemble one type of Lovelock coil (coarse three rod triangular)[14] and are duplicated by modern Maidu and to some extent by modern Washo ware.

Nets. One small fragment of netting (1-74814) was found at a depth of 28 inches. It is made of two-strand twisted Apocynum (?) fiber, 0.6 mm. in diameter. The mesh is 65 mm. square. Our fragment includes four mesh knots (also called becket bend or sheet bend). In the University of California Museum of Anthropology there is a specimen (1-4479) labeled "gill net for suckers," and collected before 1904 from the Paiute of Carson Valley, Nevada. It is 60 feet long and 28 inches high and is identical with our fragment except that the mesh size is smaller (43 mm.).

Sandals. The following is an excerpt from a personal communication from L. S. Cressman, dated July 20, 1942.

"The sandals are not like Oregon types but are more suggestive of them than the early Southwest types. We had three types in the Oregon caves, one of which occurs in Lovelock, but your specimens are all different from ours."

1-81565. Sandal fragment. Toe and heel missing. Four warps. Wefts unknown because of fragmentary condition. Tightly twined with weft rows lying against one another and making a solid sole. Tie loops on each side of heel formed by twisting two parts of the weft elements into a single two-ply twisted rope to form a loop extending about 6 cm. from the sole edge. The loop returning to the warps is untwisted and proceeds as twined weft. These loops form the side heel support and through them a two-ply rope is looped. This passes through the inner part of the right loop and crosses back of the ankle to the left loop where the upper element of the doubled rope is inserted into the left loop from the outside, passes over itself to cross and enter the right loop from the outside and run forward to the instep in front of the ankle to go through the loop from the outside and run forward over the instep to meet the other element from the right loop. The

[12] Loud and Harrington, 1929, p. 69; Weltfish, 1932, pp. 111, 112.

[13] Personal comunication, July 20, 1942.

[14] Weltfish, 1932, p. 110.

left-hand part of the tie string ends in a slip knot (Fig. 57, *a*).

1-81564. Sandal fragment. Four warps. Weft extends beyond each side, where it emerges from the last warp and forms a tie loop with both elements twisted into a single two-ply rope. The loop extends about 3.5 cm. from the edge of the sole, then turns back and forms another twining weft 3.5 cms. in front of the last. This continues and is produced on each side. Because of the continuous weft separated from the adjoining weft this sandal is very loose in construction. It is made from loose bunches of shredded sagebrush bark which, while soft, must have worn out very quickly. The method of fastening cannot be determined because parts are lacking.

1-81563. Sandal fragment. The warps are like 1-81564. While the weft is also like 1-81564, it is more complete and shows a large loop, apparently for tying, which is to go back of the leg and be tied up with the side loops. The front is broken off (Fig. 57, *b*).

Quill braid. An unusual fragment of braided work was found (1-74847, Fig. 56, *h*). It consists of two parallel passive elements joined together by a single weft which interweaves them by a continuous figure "8" movement. In this specimen the warps are two pieces of two-strand Apocynum twine, which have been stained with red ocher and tied together by an overhand knot in one end. The weft is a continuous strand of porcupine quills (probably united by inserting the end of one quill into the end of another). In the Oakland Public Museum there is an identical piece which is wrapped around an otterskin purse and was obtained from the Hupa. A second poorly made but similar specimen is wrapped around the grip of a Modoc bow. A specimen has been described from an archaeological site in southern Nevada.[15]

Twine and cordage. A total of 48 pieces of two-strand twisted twine and cordage were found. Specimens of three or more strands were absent. The salient features are described in Table 12. Pieces of twine which are portions of more important specimens are listed in the table, but these are more fully described elsewhere. Two features appear important: Specimens of less than 2.5 mm. in diameter are twisted to the right ("S" twist) whereas those of larger diameter are twisted to the left ("Z" twist). This same dichotomy extends to the material, the smaller specimens being usually made of a soft Apocynum-like fiber whereas the larger pieces are usually made of much stiffer shredded sagebrush bark fibers.[16] The real relationship may actually be between material used and direction of twist rather than between each of these and diameter.[17] A total of some 22 separate knots were observed. Their functions are described elsewhere, but they may be listed as follows: Overhand knot, 12 examples; mesh knot (or becket or sheet bend), 6 examples, four of which were in one small piece of netting. The single bow knot, the loop knot, and the clove hitch each occurred once, as did an unnamed hitch formed by throwing the bight of a doubled piece of twine across a twig and then pulling the two free ends through the bight.[18]

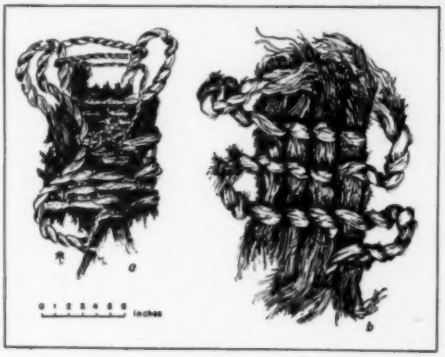

FIG. 57. Twined sage brush bark sandals from Tommy Tucker Cave, California.

Artifacts of stone. Artifacts of stone, other than projectile points, were rare. An arrow shaft straightener of pumice (1-74699) was grooved longitudinally on opposite sides and had been broken along the groove. It had apparently originally been rectangular, 80 mm. long, *ca.* 50 mm. wide, and 12 mm. thick.[19] A basaltic peb-

[15] Wheeler, 1942, p. 16, Fig. 23, *b*.

[16] Kelly (1932, pp. 135–6) says that the Surprise Valley Paiute made string of two materials, viz., the inner bark of the sagebrush and a stronger string from *wiha'b*, an unidentified plant. This latter was used in making nets. Dr. Robert F. Heizer informs me that *wiha* is the Northern Paiute word for Apocynum.

[17] A similar difference, although not so striking, was noted at Promontory Point Cave 1, and at Lovelock Cave; cf. Steward, 1937, p. 38.

[18] Authority for knot names is Webster's New International Dictionary, 2nd ed.

[19] The grooved arrowshaft straightener is affirmed by most of Stewart's Northern Paiute informants: Stewart, 1941, p. 385, etc.

TABLE 12. TWINE AND CORDAGE

Cat. No.	*Material*	*Diam. in mm.*	*Twist*	*Remarks*
1-74814*	Apocynum	0.6	"S"	Fragment of a gill net, 4-mesh knots
1-74791*	Apocynum	1.0	"S"	Wrapped thrice around juniper twig and tied with overhand knot
1-81577	Apocynum	1.0	"S"	
1-74793*	Sinew	1.0	"S"	Bound to a pointed stick
1-74719*	Apocynum	1.3	"S"	Two hundred small circular *Olivella* beads strung on string
1-74825	Apocynum	1.3	"S"	
1-74831	White fiber	1.3	"Z"	Overhand knot in one end
1-74721*	Apocynum	1.5	"S"	String stained red, *Haliotis* pendant on it, overhand knot in one end
1-74847*	Apocynum	2.0	"S"	Forms base for quill braid
1-74792	Apocynum	2.0	"S"	Looped around juniper twig
1-74820	Apocynum	2.0	"S"	
1-74821	Apocynum	2.0	"S"	
1-74816	Apocynum	2.0	"S"	Overhand knot in twine
1-74822	Apocynum	2.0	"S"	
1-74823	Apocynum	2.0	"S"	
1-74824	Apocynum	2.0	"S"	
1-74827	Apocynum	2.0	"S"	
1-81585	Apocynum	2.0	"S"	
1-74817	Apocynum	2.0	"S"	Three pieces tied together with unrecognizable knots
1-74829	Apocynum	2.0	"S"	
1-74830	Apocynum	2.0	"S"	
1-74818	Apocynum	2.0	"S"	Slip knot (or single bow) in twine
1-74819	Apocynum	2.0	"S"	
1-81581	Apocynum	2.0	"S"	
1-74826	Apocynum	2.3	"S"	
1-74832	Apocynum	2.3	"S"	
1-74834	Apocynum	2.3	"S"	
1-74828	Tule	2.3	"S"	
1-74815	Apocynum	2.5	"Z"	Two pieces tied together by unrecognizable knot
1-74835	Shredded sagebrush bark	2.5	"Z"	
1-81592	Shredded sagebrush bark	3.0	"Z"	Overhand knot in one end
1-81576	Grass	3.0	"Z"	Overhand knot in one end
1-81536	Shredded sagebrush bark	3.3	"Z"	
1-81574	Shredded sagebrush bark	4.0	"Z"	Single strand, doubled and twisted as two
1-81575b	Shredded sagebrush bark	4.0	"Z"	Overhand knot in end
1-74837	Shredded sagebrush bark	4.0	"Z"	
1-81582	Shredded sagebrush bark	4.0	"Z"	
1-81583	Shredded sagebrush bark	4.0	"Z"	
1-81579	Grass	4.0	"Z"	
1-81575a	Shredded sagebrush bark	5.0	"Z"	
1-74840	Split triangular tule	5.0	"Z"	
1-81573	Shredded sagebrush bark	8.0	"Z"	
1-74842	Shredded sagebrush bark	8.0	"Z"	
1-81565*	Shredded sagebrush bark	9.0	"Z"	Sandal cord, tapering; 5 mm. to 12 mm.
1-74841*	Shredded sagebrush bark	11.0	"Z"	
1-81565*	Shredded sagebrush bark	12.0	"Z"	Woof of sandal; forms tying loops
1-81564*	Shredded sagebrush bark	14.0	"Z"	Woof of sandal; forms tying loops
1-81563*	Shredded sagebrush bark	15.0	"Z"	Woof of sandal; forms tying loops

* Described in greater detail elsewhere in the text.

ble (1-74700), 55×30×15 mm., is similar to specimens described by Loud[20] as flint crackers. Two waterworn flat stones showed slight signs of hammering and were certainly of extraneous origin. One is 25×15×8 cm., the other 20×11×7 cm. Six scrapers made from single flakes with one or more edges retouched were found. Four are of obsidian (1-74668, 74653, 74665, 74666) and two of white chert (1-74680, 74681). A cone-shaped core (1-74669), made from a halved pebble of obsidian, may also have served as a scraper. It is 25 mm. in diameter.

Three cracked quartz crystals (1-74701, 74702, 74703) and an opal pebble (1-74704) were found. Five smoothed lumps of hematite, none larger than a thimble, were probably used for paint (1-81591, 74876, 74877, 74878, 74879).

Projectile points. A total of 22 projectile points was found in the cave. They are illustrated in Figure 58 and are described in Table 13. The classification system we have used is the dual one initiated by Krieger for the Oregon cave material.[21] Under this system points are grouped by size into "classes" with weight being considered the most important of size criteria, and then by shape into "types." Our series is small but the neat correspondence between Type 8 and Class 3 on the one hand, and Type 1 and Class 1 on the other, parallels the Oregon results and strengthens the inference that the typology has cultural meaning.

Projectile shafts and foreshafts. An arrow fragment was found. This specimen (1-74787) consisted of a fragmentary white chert point bound with sinew into a slot in a hardwood foreshaft which is 6 mm. in diameter and 20 cm. long. Twenty-four mm. of the foreshaft is fitted into a hollow cane shaft which bears a broad sinew seizing at its tip and a second, narrower seizing 35 mm. nearer its proximal end. This cane shaft is 8 mm. in diameter (Fig. 58, *s*).

A second projectile fragment (1-74786) consists of the proximal end of a juniper wood foreshaft, 14 cm. of which extends into a heavy cane shaft, 10 mm. in diameter. The distal end of the cane shaft has been sharpened to a hollow point from a joint in the cane, and this tapering portion has been seized with a broad band of sinew which holds the foreshaft in place. The speci-

TABLE 13. PROJECTILE POINTS

Cat. No.	*Material*	*Length*	*Breadth*	*Weight*	*Class*	*Type*	*Remarks*
1-81602	White chert	(35)*	16	(1.1)	1	1	Fig. 58, *e*
1-74649	Obsidian	28	14	1.1	1	1	Fig. 58, *f*
1-74650	Obsidian	29	14	1.2	1	1	Fig. 58, *g*
1-74652	Obsidian	26	20	1.0	1	1	Fig. 58, *h*
1-74647	Obsidian	26	17	1.2	1	1	Fig. 58, *i;* stained with red ocher
1-74646	Obsidian	29	13	1.2	1	(1)*	Fig. 58, *j*
1-74634	Obsidian	22	18	1.1	1	(1)	Fig. 58, *k*
1-74648	Obsidian	24	16	1.1	1	1	Fig. 58, *l*
1-74645	Obsidian	25	14	0.9	1	1	Fig. 58, *m*
1-74637	White opal	22	13	0.7	1	1	Fig. 58, *n*
1-74639	Obsidian	(26)	16	(0.6)	1	1	Fig. 58, *o;* fragmentary
1-74644	Obsidian	23	16	1.0	1	1	Fig. 58, *p*
1-74638	Obsidian	26	22	(1.5)	1	1	Fragmentary
1-74640	Obsidian	(—)	21	(1.3)	1	1	Fragmentary
1-74641	Obsidian	(—)	19	(—)	1	1	Fragmentary
1-74642	Obsidian	(16)	12	(—)	1	1	Fragmentary
1-74787	White chert	(25)	19	(—)	1	5	Fig. 58, *s;* on arrow shaft fragment
1-74653	Black basalt	36	17	2.2	2	(1)	Fig. 58, *c*
1-74643	Jasper	(31)	21	(2.3)	2	(3)	Fig. 58, *d;* fragmentary
1-74636	Obsidian	(38)	23	(3.5)	3	8	Fig. 58, *a;* fragmentary
1-74651	Obsidian	35	24	3.3	3	8	Fig. 58, *b*
1-74635	Obsidian	34	23	3.1	3	8	Not illustrated

* Parenthesized measurements indicate approximations. Parenthesized types indicate that the writers regard these specimens as variants of the ideal. Lengths and breadths are given in millimeters, weight in grams.

[20] Loud and Harrington, 1929, p. 145 and Pl. 65, *i, r, s, t.*

[21] In Cressman *et al.*, 1940, p. 41 *et seq.*

men seems too heavy to have been an arrow and we suggest that it is a fragment of an atlatl dart (Fig. 58, *g*).

A section of the butt end of a cane shaft (1-74784) is illustrated in Figure 58, *r*. It is made of a heavy piece of cane, is stained a dark red brown, and is 9 mm. in diameter. The marks of a narrow, spiral seizing of sinew can be seen in the illustration. In the red ocher staining and the seizing pattern this specimen is identical to the butt end of a complete atlatl dart from Pershing County, Nevada.[22]

There are three small sections of cane shafts (1-74780, 74781, 74779), all of which exhibit the marks of sinew seizing and are encircled by bands of pitch or black pigment. A fragmentary wood foreshaft, 7 mm. in diameter, bears a sinew wrapping.

Miniature arrow (?). A possible miniature arrow (1-74788, Fig. 56, *e*) is made from a heavy grass stalk, 3 mm. in diameter and 84 mm. long. The stalk has been split at one end and a minute flake of obsidian has been bound into it by a sinew wrapping. The flake is square across the end and projects less than 1 mm. beyond the shaft. It may originally have been pointed but as it is the implement would serve for incising or engraving fine lines. A Surprise Valley Paiute game in which rye-grass arrows are thrown (or shot with a miniature bow) at mud balls has been described.[23] The ethnographer does not state that the arrows were tipped.

Bark wrapped stick. A sagebrush stick, 8 mm. in diameter and 165 mm. long, is heavily wrapped for 85 mm. of its length with a withe of sagebrush bark (1-81600; Fig. 56, *a*). The stick is knotted and curved and has not been finished in any manner. Similarly wrapped arrow foreshafts were found at Lovelock Cave[24] where they were interpreted as "fire brands," but seem more likely to have been stunning points. Our specimen could not have been an arrow foreshaft because of the roughness and curvature of the stick.

Various objects of wood. There is a wooden peg (1-81601) 115 mm. long and 12 mm. in diameter. The bark has been removed, one end has been sharpened to a point, and the other exhibits heavy hammering (Fig. 56, *b*). A polished hardwood stick is 92 mm. long and 4 mm. in diameter. It is pointed at one end, cut off at the other. A very similar specimen (1-74800) is 60 mm. long, 7 mm. in diameter. A half-round hardwood stick (1-74807) is 132 mm. long, 13 mm. in diameter. It is pointed at one end, sawed off at the other. Two small sticks have been partly sawed through and then broken (1-74797, 1-74795). A willow stick 11 mm. in diameter is sharpened at one end, broken at the other (1-74808). A stick, 8 mm. in diameter, is heavily hammered at one end, broken at the other (1-74802).

A number of wrapped sticks were found. These include: a twig of sagebrush 5 mm. in diameter which has a loop of twine thrown over it with the free ends pulled through the loop (1-74792); a pointed juniper twig, with shredded sagebrush bark wrapped loosely around its unsharpened end (1-74789); a juniper twig which has a piece of Apocynum twine wrapped in three courses around it and tied with an overhand knot (1-74791); and finally, two juniper twigs united by a wrapping of juniper bark (1-74790).

Artifacts of bone and horn. A total of seven artifacts of bone and horn were recovered. These include a very small fragment of a bone awl. A flat perforated bone needle (1-74727, Fig. 58, *e'*) is 105 mm. long, 12 mm. wide, and 2 mm. thick. It is rounded at one end, pointed at the other, and has a perforation near the pointed end. This type has not been described before, but it would serve in the manufacture of twined tule matting. A decorated bone pin (1-74726, Fig. 58, *f'*) lacks its tip, but would have been 115 mm. long; it is oval in cross section (7 mm.×5 mm.). The decoration consists of four grouped incised lines which wind spirally around the specimen for its entire length.[25] Two decorated bird-bone tubes, while not found together, undoubtedly constitute a pair. Both specimens are 55 mm. long, 7 mm. in diameter, and have been stained with red ocher. One specimen (1-74724, Fig. 58, *g'*) is decorated by a pair of incised lines which encircle it near each end and a spiral line which runs twice around the tube medially; the second specimen (1-74725, Fig. 58, *h'*) is identical except for the fact that a third pair of incised lines, rather than a single spiral line, encircles it medially. These two tubes probably served as dice in the hand game, although they are not identical with

[22] Heizer, 1938, Fig. 1.

[23] Kelly, 1932, p. 171.

[24] Loud and Harrington, 1929, p. 115 and Pl. 46, *d*.

[25] A similarly shaped incised bone pin is described by Loud and Harrington, 1929, p. 37 and Fig. 7, *d*. The style of decoration is quite different, however.

ethnographic specimens from this area.[26] If this surmise as to function is correct, the difference between the "marked" and "unmarked" bone is unusually subtle in this pair. A single bipointed bone pin (1-74723, Fig. 58, *i'*) was found. It is 41 mm. long and 3 mm. in diameter. Most of Stewart's Northern Paiute informants affirmed the use of such specimens as gorge hooks in fishing.[27] A fragmentary pendant of mountain sheep horn is made from a polished chip. It is 35 mm. long and has a hole drilled near one end (1-74722, Fig. 58, *j'*).

Ornaments and beads of shell. Beads and ornaments of shell were numerous as compared with other Basin sites. There were six beads fashioned from whole shells of *Olivella biplicata*, with their spires ground off (1-74710, 74711, 74712, 74713, 74714, and one specimen in the Hellman collection; Fig. 58, *u*, *v*, *w*). One specimen (1-74711) is stained with red ocher. Two other beads were made from roughly cut half-shells of *O. biplicata* (1-74716, 1-74715; Fig. 58, *z*, *a'*). The latter specimen has a strand of bark tied through the perforation with an overhand knot. A third similar specimen (1-74717, Fig. 58, *x*) is more carefully made and has a very small perforation drilled near one end, rather than centrally. It is stained with red ocher. One other bead of the same material (1-74718, Fig. 58, *y*) is circular and cut from a smooth portion of the shell. A string 16 cm. in length, broken at each end, bears 230 minute (2.5 mm. in diameter) disc-shaped beads (1-74719, Fig. 58, *t*) of an unidentifiable shell (probably *Olivella*). A pendant of freshwater mussel shell (*Margaretifera margaretifera*) is rectangular with rounded

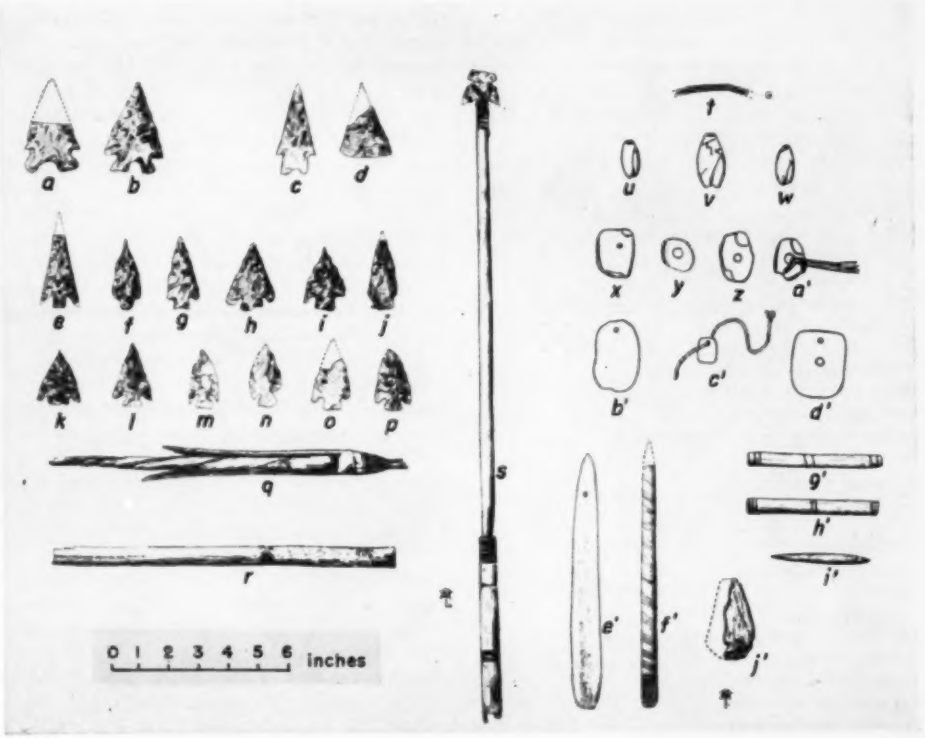

FIG. 58. Stone, bone, and shell artifacts from Tommy Tucker cave, California: *a–p*, projectile points; *q–s*, projectile shafts; *t–d'*, shell ornaments; *e'–j'*, bone artifacts.

[26] Cf. Culin, 1907, especially p. 311 and Fig. 408.

[27] Stewart, 1941, p. 371.

corners, 28 mm. long, 18 mm. wide, and has a perforation near one end (1-74720, Fig. 58, *b'*). A pendant of *Haliotis rufescens* (1-74721, Fig. 58, *c'*) is rectangular, 10 mm.×8 mm., is perforated near one end, and is strung on a short string, which is stained a bright red and has an overhand knot in one end. The final artifact of shell is a rectangular pendant of *H. rufescens* in the Hellman collection. It has rounded corners, is 25 mm. by 21 mm., and has one perforation centrally and one near one end (Fig. 58, *d'*).

Bundle of obsidian flakes. A bundle (1-74838, Fig. 56, *d*) consisting of three small flakes of obsidian completely wrapped in shredded sagebrush bark was found. The flakes are flat, show no secondary flaking, and average between 15 and 20 mm. in diameter. The complete bundle is 30 mm. in diameter.

Faunal remains. The following mammalian and avian remains were found in the cave.

MAMMALIA

Ovis canadensis (Big Horn): 11 specimens plus one artifact
Lepus sp.? (Jack rabbit): 3
Citellus beldingi (ground squirrel): 1
Taxidea taxus (badger): 1
Sylvilagus sp.? (cotton tail): 2
Citellus beecheyi (ground squirrel): 2
Erithizon sp.? (porcupine): 20 quills and 1 artifact made from quills
Domestic sheep: 1

AVES

Dafila or *merganser:* 1
Falco mexicanus: 1
Falco sp.? probably *peregrinus:* 3
Falco sp.? peregrinus or *mexicanus:* 3
Numenius americanus: 2
Nettion or *Querquedula:* 1
Redurvirostra americana: 1
Canyon wren (feather): 1
Shore bird: 1

An additional 24 bones were too fragmentary to permit specific identification.

The molluscan remains have been described under "shell ornaments." Of the molluscan remains it should be noted that only *Margaretifera* is a local species.

Special botanical remains. A mass of borage seeds amounting to about one pint was found at a depth of 14 inches. They have been identified as belonging to two species, *Cryptantha pterocarya* and *Amsinckia intermedia*. Presumably they had been collected for food. A small bundle of tips of sagebrush plants (*Artemisia tridentata*) is held together by a withe wrapping. There is a very similar bundle of stems of *Chrysothamnus*. Both these bundles occurred in the upper 20 inches of the deposit. There are also two small coils of *Deschampsia* (grass; 1-81570, 81580), both coming from the upper 20 inches of the deposit.

Depth differences. This section and the accompanying table (14) are presented chiefly in the interest of making a full, objective record. With the possible exception of two artifact types, the differences seem insignificant. We have chosen to distinguish between the depths 0 to 20 inches and 20 inches to 40 inches; actually this is very nearly the same as distinguishing between our first and second visits to the site. This is purely an arbitrary distinction. It has no reality stratigraphically, nor does it result in appreciably greater or lesser cultural differences than would any other arbitrarily chosen depth. Difficulties in distinguishing between what was earlier and what was later were due to the extreme looseness of the deposit and the irregular nature of its surface.

Certainly the most significant depth differences in artifact types is to be noted for the sharpened twigs and split cane cut-offs. Both types occurred from top to bottom of our excavations, but a shift in emphasis is apparent. The writers have already suggested game counters as a possible function of each of these types, and the obvious implication is that one type of gambling game (or at least one method of counting score) became popular as the other fell into disfavor. As to the total number of artifacts found, there is virtually no depth change other than that produced by the numerical preponderance of sharpened twigs in the upper 20 inches of the deposit. We hesitate to stress depth differences. Speaking subjectively, the "feeling" we had during the course of the excavations was one of homogeneity from top to bottom.

Conclusions. The temporal position of the site as a whole is probably late pre-contact and early post-contact.[28] The surface find of a single bone (mandible) of the domestic sheep is not conclusive since it could have been dragged there by a predator or may evidence the transient use of the cave by a recent traveler. The iron knife is also a surface find, but may be of

[28] Direct contact could have been achieved by 1849, certainly by 1853 when the first settlement was made in the Honey Lake Valley.

TABLE 14. DEPTH DIFFERENCES

Artifacts	*0 to 20 in.*	*20 in. to 40 in.*
Sandals	3 specimens, 2 types	None
Basketry	1 specimen, fine twine	1 specimen, coarse twine, 2 specimens, coil
Pine nut beads	2 specimens, type 2	3 specimens, type 1
Lump of hematite	1 specimen	4 specimens
Flake scraper	3 specimens	3 specimens
Bone implements	Bipointed bone pin, awl fragment	Incised bone awl, incised bone tubes (2), horn pendant, flat bone needle
Sharpened twigs	700 specimens	143 specimens
Split cane cut-offs	4 specimens	23 specimens
Cane "awls"	5 undecorated specimens	2 decorated specimens
Cracked quartz crystals	2 specimens	1 specimen
Projectile points	Class 1, type 1, 8 specimens	Class 1, type 1, 6 specimens
	Class 3, type 8, 2 specimens	Class 1, type 2, 2 specimens
		Class 1, type 5, 1 specimen
		Class 2, type 1, 1 specimen
		Class 2, type triangular, 1 specimen
		Class 3, type 8, 1 specimen
Projectile shafts	Fragment (1-74786)	Arrow fragment (1-74787)
		Butt end of projectile shaft (1-74784)
Spire-lopped *Olivellas*	3 specimens	3 specimens
Shell pendants	*Margaretifera* (1-74716) and *Haliotis* in Hellman collection	*Haliotis* (1-74721)
Unique specimens	"Fire brand"	Bundle of obsidian flakes
	Grass stalk with obsidian bound in it	Quill braid
	Pumice shaft straightener	Gill net fragment

Indian manufacture. The wood chips were, we believe, produced by a metal implement. Finally, pine nut beads (found at all depths in our excavations) are believed by Heizer[29] to occur in late prehistoric and historic sites. We have earlier stated that Tommy Tucker Cave is situated in territory occupied in historic times by a Northern Paiute band, the Wadadökadö. The upper levels of the cave may well represent occupation by these peoples in the years just before 1860.

[29] In Cressman, 1942.

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California Archaeological Survey
University of California
Berkeley, California
October, 1948

JOHN HAYNES BAILEY, 1909–48

WILLIAM A. RITCHIE

ON the night of July 5, 1948, under circumstances which may never be explained, John Haynes Bailey "shuffled off this mortal coil." Some two years previously he had undergone a major surgical operation from which, insofar as his family and his friends were aware, he had recovered, but the incubus of ill health offers the most probable solution to the enigma of his tragic death.

Born on May 22, 1909, in the western New York village of Dansville, as the only child of James Albert Bailey, an attorney, and Marie (Haynes) Bailey, he was early taken to Caledonia, also in the Genesee Country, where he received his pre-collegiate schooling. In 1933 he was graduated from Cornell University with a bachelor's degree in physics.

His early interest in the rich prehistoric past of his native region led to our meeting and the beginning of a friendship which matured during his summer sessions with me in the field while he was still an undergraduate. In 1934, as an Assistant in the Archaeology Division of the Rochester Museum of Arts and Sciences, he accompanied me on numerous field expeditions to various parts of New York state and worked meticulously in the laboratory.

In the spring of 1937, soon after the organization of the Champlain Valley Archaeological Society, with headquarters at Fort Ticonderoga, New York, and the Fleming Museum of the University of Vermont at Burlington, he became their archaeologist, in this capacity conducting explorations on a number of important sites, references to which will be found in his bibliography, and creating exhibits in the Fort Ticonderoga Museum.

His broad interest in museum work induced him, in 1940, to accept the directorship of the Davenport Public Museum in Davenport, Iowa. In the same year he was married to Miss Gail Wellwood, whom he had met while she was a student worker at the Fleming Museum. She, their two children, John and James, and his mother survive him.

Although most of his energies at Davenport were consumed with the reorganization of the extensive museum collections and the installation of exhibits, he found time actively to participate in numerous hobby, civic, and scientific groups; to teach a course in archaeology at Augustana College, Rock Island, Illinois; and to continue his earlier interest in field work by investigating sites in Iowa and Illinois, in the Davenport vicinity.

Bailey's chief contributions to archaeology are to be found in his papers of the Champlain Valley Archaeological Society. His work on the Donovan site near Vergennes, Vermont demonstrated a regional variant of the Laurentian culture, while his excavations in the Chipman's Point rock shelter revealed a succession of prehistoric levels which serve as the beginnings of a chronological framework for this part of the Northeastern area.

His personal qualities of amiability, loyalty, geniality, and fortitude were an inspiration to his friends, to one of whom has befallen the sad task of recording this brief tribute.

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SYLVANUS GRISWOLD MORLEY, 1883–1948

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THE death of Sylvanus Griswold Morley on September 2 brought to a close a brilliant career and probably also an important phase of Maya research. His achievements are outstanding in the fields of archaeological exploration and epigraphy; and he had a talent for imparting to others his intense concern for everything pertaining to the Maya people, whether ancient or modern. All was grist that came to his mill, if it had any bearing on this subject; and where there was an application to the hieroglyphs, he ground to exceeding fineness. It is hardly an exaggeration to say that he has done more to spread an intelligent interest in Maya civilization than anyone since Stephens, over a century ago.

He was a winning and sympathetic person and made friends in every quarter. He was open-handed to a fault, not only with his material possessions, but also with unpublished scientific data that he had acquired the hard way, even when he knew it would be used to question some cherished thesis of his own.

Morley was born at Chester, Pennsylvania, where his father, Col. B. F. Morley, was professor of chemistry and vice president of Pennsylvania Military College. The latter was from Iowa, but of colonial New England stock. Morley's mother, Sarah Constance Elinor de Lannoy Morley, was the daughter of a professor of languages at the college and the granddaughter of a Supreme Court Judge of Belgium. From a letter of his brother, J. H. Morley, to J. E. S. Thompson we learn of Morley's boyhood at Buena Vista in the mountains of central Colorado, where the family moved when he was ten years old. At an early age he wanted

FIG. 59. Sylvanus Griswold Morley.

* The text of this obituary was prepared by the senior author; the bibliography, by the junior author.

to be an archaeologist, but his father insisted that he study engineering at Pennsylvania Military College, and he graduated with the degree of C. E. in 1904. He went on to Harvard, where he took his B.A. three years later. Here he was awarded a research fellowship in American archaeology and was given his A.M. in 1908. In 1920 he received the honorary degree of Ph.D. from the Pennsylvania college.

Morley's first interest had been Egypt, but under the influence of Professor Putnam and Alfred M. Tozzer he turned to the Maya field. During these Harvard years he made several trips to Yucatan and did field work for the Archaeological Institute of America in the Southwest of the United States. In the latter his association with A. V. Kidder was the beginning of a close and life-long friendship.

From 1909 to 1914 Morley was a member of the staff of the School of American Archaeology, working first in northern Yucatan and later at Quirigua, Guatemala, under E. L. Hewett. At the latter site the impressive architectural repairs and restorations, the first to be undertaken in the Maya area, still bear witness to his ability as archaeologist and engineer. In 1914, with H. J. Spinden, he made a survey of parts of the Usumacinta and Peten areas.

In these years he published 13 papers, the first of which was his well known decipherment of the dates at Naranjo with an analysis of their significance. It was also during this period that his first major work was written and accepted by the Smithsonian, although it was not published until 1915. This was "An Introduction to the Study of the Maya Hieroglyphs." In his preface he modestly announced it as an archaeological primer, which was decidedly an understatement. Although he gave ample credit to his predecessors, its presentation was a step in advance of any previous study of the glyphs and showed its author as a mature scholar competently breaking new ground. Here he identified the so-called "winged" Cauac glyph as a variant of the tun (360-day) sign and one of its derivatives as the hotun, or 1800-day period. The work has continued to be the standard handbook on the subject; without this clear and fully illustrated presentation of the hieroglyphic phase of Maya culture, there could easily have been a very considerable delay in the appreciation of its significance by anthropologists generally.

In July, 1914 Morley presented to the Carnegie Institution of Washington a plan for the comprehensive study of Maya inscriptions. This was approved, and he became Research Associate in American Archaeology in 1915, continuing in this capacity for the rest of his life. The project was an ambitious undertaking; it meant placing the architecture and inscriptions of the lowland Maya in a sound framework of place and relative time. This was a task to be ventured upon only by an indomitable archaeological explorer, who must also be a specialist in epigraphy.

Setting out in February, 1915 with a single assistant, he copied and photographed new material at Copan, and made two trips into the Peten district of northern Guatemala. On the latter journeys seven newly dated cities were added to the 19 already known; eight new Initial Series and ten new period-ending dates were discovered; and numerous corrected or new readings were made of previously reported texts.

This success was partly due to an interesting circumstance. Sapote trees are apt to be numerous in the neighborhood of ruined sites. Presumably they were cultivated for their fruit around the residences in these ancient shrine cities, and in the surrounding milpas the wild trees were spared in spite of the usual slash-and-burn method of agriculture. These are the same trees now sought for chicle gum, and Morley offered rewards for information of new sites and sculptured monuments. His friendly relations with officials and buyers of the chicle companies, not to mention his personal popularity among the *chicleros* themselves, were probably even more effective in taking advantage of this situation.

With the achievements of 1915 behind him, it is not surprising that the Carnegie expedition the following year was a larger one. It marked Morley's discovery of Uaxactun and the first monuments with contemporary 8-Cycle (or Baktun) dates. Uaxactun was in new territory, first penetrated by *chicleros* only three years before, so Morley had not lost much time. Its significant bearing on the problem of the origin of lowland Maya civilization in its historical habitat was immediately obvious; and the importance of the place was later enhanced by the discovery of a 10-Cycle date, making it one of the latest as well as the earliest dated classical Maya city.

This journey of discovery had a tragic ending.

On the return, not far from the border of British Honduras, the party was ambushed by troops, who mistook them for revolutionists. Dr. La Fleur, the expedition physician, and the guide were killed, while Morley and his photographer narrowly escaped with their lives.

W. H. Holmes, Head Curator of the U. S. National Museum, accompanied the expedition to Copan, where he made one of his famous architectural panoramas of the site. Morley also went to the almost legendary walled city of Tulum, which had been visited only twice (once by Morley himself in 1913) since Stephens' time, and for no more than a single day on either occasion because of hostile Indians. This time S. K. Lothrop was able to map the site, while Dr. Thomas Gann made copies of a number of mural paintings.

For several years Morley continued his intensive study of Copan. Trips were made in Honduras locating sites and tracing the border of the Maya area from Copan to the Caribbean and, farther afield, even into Nicaragua, seeking evidence of Maya influence overlapping this frontier.

During this time one of his publications was a paper on the hotun glyph, already mentioned. Another was the elaborate presentation in the *Holmes Anniversary Volume* of 80 cases where a peculiar group of five or more unsolved glyphs, which Bowditch had christened the Supplementary Series, accompanied an Initial Series date in an inscription. Morley made drawings of these glyphs and carefully arranged them in tabular form on large plates. His analysis of the problem included definite identification of many glyphs as moon signs, although a few of them that were obvious crescents had previously been given this meaning with some hesitation. With the collaboration of an astronomer he solved one of the glyphs as indicating whether the current lunar month was considered to be 29 or 30 days in length, since the Maya did not use fractions but alternated 29- and 30-day months. He concluded that the principal meaning of this group of glyphs was a lunar count of some sort. Later this pioneering effort led to J. H. Teeple's brilliant solution of the problem, which disclosed that these glyphs recorded the number of days elapsed since the last new moon and the number of months since the current lunar half-year began. Thompson informs me that Teeple was reluctant to work from photographs, and it seems probable that much of the latter's success was made possible by Morley's accurate drawings. Subsequently, Thompson was to solve the remaining numerical glyph in the group as indicating the position of the date in an endlessly repeating count of the nine Lords of the Night.

Morley's monumental work, "The Inscriptions at Copan," which appeared in 1920, was far more than a report of his five years of work on the inscriptions at that site. He made an exhaustive study of every legible or semi-legible text at Copan and recorded his results in a way that allows any follower or critic to reappraise them; but this was only the formal framework. To it he added introduction, maps, charts, tables, and appendices which applied to the Maya area as a whole and to the general calendrical problem. Just as his "Introduction to the Study of Maya Hieroglyphs" is a text book, so this volume is a fully rounded illustration of its use.

In an appendix to this book Morley developed a correlation of the Maya and European calendars, which he had first suggested in 1909. It was espoused by Spinden, who elaborated it in various respects, and was accepted for a long time by most investigators. Largely because of Thompson's work it is no longer so widely held, and Morley himself discarded it in his 1937–38 book. Nevertheless the latter's 1920 exposition remains a classic as a model for the methodological approach to similar problems. He presented all the data, both pro and con, so fairly that, although new material was of course an important factor, he himself had supplied a large part of the evidence by which his thesis was ultimately refuted. Surely impartial and constructive scholarship could go no further.

For the next four seasons Morley continued to explore the Peten, laying the foundation for another monumental work on Maya inscriptions. Six archaeological sites, some 40 Initial Series, and many other new deciphered dates were discovered. He also initiated a broader approach to the historical problems involved. One expedition was accompanied by a group from the Bureau of Plant Industry, who found indications that Maya civilization here had been based on a slash-and-burn agricultural system. Another year a collaborator from Carnegie's Department of Terrestrial Magnetism determined the latitude and longitude of the more important sites; and one from the

U. S. Geological Survey made a topographical survey of Lake Peten. So many long and consecutive seasons in the field might suggest that Morley loved to rough it; but nowhere are the rain forests of the *tierra caliente* a comfortable place, and probably no one hated discomfort more than Morley did.

In 1924 the Carnegie Institution of Washington inaugurated a long-range program of intensive research at Uaxactun and Chichen Itza. The latter site was selected partly because of its imposing and varied architecture and partly because it is the only Initial Series site that figures prominently in the historical traditions of the Maya, thus offering promise of being a link between the classical Maya and the period of the Spanish conquest.

Morley had long been well known both in Mexico and Guatemala through personal connections and his Spanish articles and lectures. Not only did he have much to do with obtaining permits from the governments concerned, but he has always played an important part in establishing and maintaining the warm friendship and hearty cooperation existing between the scientists of those countries and the United States.

Both the Yucatan and Guatemala projects were organized under his direction; but it was at Chichen Itza that he remained as resident in charge. The extensive excavations and repairs there and the staff of archaeologists by whom they were carried out, need no mention here. In 1929 the Division of Historical Research was reorganized to include other angles of approach to the problems of Maya research under the leadership of Morley's old friend and associate, A. V. Kidder.

Although Morley was now mainly occupied with epigraphy and executive duties, the value of his collaboration in associated fields can hardly be overstated. Few outsiders have known Yucatan and its people as he did. During the 1930's it seemed as though there was hardly a Maya Indian there who did not either know him or know about him. I have thought that his intense interest in the genealogies of some of the families directly descended from the ancient rulers endeared him to many people. On two occasions delegations came to Chichen Itza from the wilds of Quintana Roo to discuss with him problems of tribal policy. To the few who were privileged to listen in on either of these conferences, it will remain an experience never to be forgotten. Later Dr. and Mrs. Morley made the long journey to return the last of these visits. Space does not permit telling much of what he was constantly doing for other investigators; but I must mention the many photographs of almost inaccessible Maya manuscripts he secured for the Division, both in Europe and Yucatan, and his aid and counsel when one went on a field trip. As a friend of "el Doctor Morley" the newcomer found kindness and cooperation everywhere.

"The Inscriptions of Peten" (1937–38) is a modest title for a work of well over 2000 pages with hundreds of plates and drawings. Every known dated stela in the Peten, upward of 200, is covered and discussed objectively, as in the Copan volume; and hundreds more, either undated or outside the area, are discussed. Far more than 1000 dates are considered. Throughout the work is a wealth of comment, both general and comparative, and classifications cover many different points of view.

Morley's success in publicizing his field has been remarkable. With its easy accessibility, Chichen Itza has been visited by an amazing number of scientists, writers, and artists, most of whom came away impressed by the cultural importance of what they had seen. More than a few of the readers of this tribute will recall the stimulating discussions around the tea table in the graceful portico of the old colonial hacienda that was Carnegie headquarters. Morley's charm and popularity as a lecturer are too well known to need comment here; and he was tireless in his exercise of this ability to spread a general interest in the Maya. He loved to impart his method of glyph attack at all levels, from that of the high school pupil to the graduate student.

Although he constantly wrote for the professional journals, he did not neglect the general reader; his interesting, and often beautifully illustrated, articles in the magazines appealed to a large public. As a culmination of such activities we have his recent publication, "The Ancient Maya" (1946). The first printing of this large and handsome book was sold out in an unbelievably short time. Only one who knew the country and had a warm and understanding affection for its people could have brought to life the dry bones of an ancient civilization, as Morley has done.

Space does not permit an account of Morley's interest in Spanish colonial art, of which he

and Mrs. Morley assembled a noteworthy collection. Not long ago they presented it to the Museum of New Mexico; and shortly before his death he had accepted the post of Director of the Museum and the School of American Research at Santa Fe, where he had made his home for many years.

I cannot close this memorial without a tribute to his wife, Frances Rhoads Morley. Long ago the hardships of exploration, malaria, and dysentery had undermined Morley's health, a circumstance which, left to himself, he would have disregarded. Not only did she literally keep him alive, but she kept him in shape to do his work and even to take an occasional trip into the bush. She collaborated with her husband in various ways but is best known for her superb portrait photographs of the Maya, especially those of Quintana Roo.

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FACTS AND COMMENTS

THE CALIFORNIA ARCHAEOLOGICAL SURVEY

The University of California instituted on August 1, 1948, a statewide archaeological survey. Supporting funds are from the State Legislature and are part of the regular University budget. The financing is adequate, and assurance of the Survey being a permanent institution has been given. Work will be done by the Archaeologist, F. Fenenga, and Assistant Archaeologist, F. Riddell, and will entail site survey and mapping, excavation, and publication.[1] Headquarters are in the University of California Museum of Anthropology, and the Survey activities will be integrated with those of the Museum. Close cooperation is envisaged with other institutions which include the University of California at Los Angeles, Santa Barbara College of the University of California, the Santa Barbara Museum of Natural History, the Los Angeles County Museum, the Southwest Museum, the San Diego Museum of Man, Sacramento College, and the Archaeological Survey Association of Southern California.

In some ways the Survey will consist of an expansion and full time prosecution of activities which the Department and Museum of Anthropology have maintained over the past half century. Areal surveys, text excavations, and salvage of sites threatened by destruction have characterized most of the earlier work. Earlier endeavor has been characterized by the large number of investigators, none of whom chose to settle down to systematic and all-out effort in California, and by the areas chosen for investigation. In retrospect, these investigations seem almost random and casual. We know a little something about many areas, but nothing in detail for any particular region with the single exception of the Delta and lower Sacramento Valley. This exception, significantly, is due to the fact that two institutions (Sacramento College and the University of California) have cooperated in attacking the problems of survey, excavation, analysis, and publication of results. The Santa Barbara Channel coast and Southern California desert regions are becoming better known through the efforts of local institutions at Santa Barbara, San Diego, and Los Angeles.

Because of its territorial size and diversity of ethnological and prehistoric cultures, the California area can expect to achieve wider recognition as an important and integral segment of North American archaeology as future work makes progress in determining local culture content and sequences. Here, as elsewhere, earlier efforts will in some cases appear inadequate and amateurish, but much good work was done, and the moment, which may mark the beginning of a new and active phase, seems a good opportunity to recapitulate briefly the history of archaeological effort at the University of California.

During the three years (1899–1902) before the University of California organized the Department of Anthropology, Philip Mills Jones conducted a site survey and small scale excavation with funds provided by Mrs. Phoebe A. Hearst. Mills was untrained in archaeology, and aside from some Museum specimens and notes, the only results of this effort are contained in his short article in *UC-PAAE*,[2] Vol. 20, No. 7.

Organized investigation by the Department staff began in 1902 with the work of Max Uhle and C. H. Merriam at the Emeryville Shellmound (reported in *AAE*, Vol. 7, No. 1). Merriam's lifelong interest in the problem of the antiquity of man in America led to the exploration between 1902–08 of several caves (Potters Creek, Samwell, Mercer's Stone Man caves). In this work a number of investigators participated, among them F. W. Putnam, W. J. Sinclair, and E. L. Furlong. The University published two reports in *AAE*, Vol. 2, No. 1 and Vol. 7, No. 2.

The cave explorations overlapped with the early work of N. C. Nelson, who conducted a shellmound survey between 1905 and 1908 (*AAE*, Vol. 7, No. 5). S. A. Barrett in 1905–08 carried out intermittent archaeological work north of San Francisco Bay at Inverness, Ukiah, and Winters. Brief investigations at Buena Vista (published in *Sunset*, Vol. 25, No. 3) and further explorations in shellmounds on the north shore of the Bay at Sausalito, Greenbrae, and San Rafael were made by Nelson in 1908–10. In 1909–10 H. B. Waud conducted site survey in the interior of the Santa Barbara region. 1911–12 saw Nelson again active in the field (he was half-time instructor during 1909–11), this time along the southern peninsular shore at San Mateo and Bayshore.

In 1911–12 L. L. Loud worked at Lovelock Cave in Nevada. The report on this excavation combined with his and M. R. Harrington's joint work in 1924 appeared in *AAE*, Vol. 25, No. 1. Loud in the next few years found time in vacations or was released from Museum duties to excavate several Bay sites (Mayfield and Glen Cove) and at Halfmoon Bay south of San Francisco. His next work, a survey and single excavation at Humboldt Bay resulted in the report (*AAE*, Vol. 14, No. 3) which stands today as our sole evidence for the prehistory of the northwestern coastal region of California. In 1913–14 H. O. Welty made a site survey of the San Diego Bay area, and a year later E. W. Gifford reopened the question of the antiquity of the San Francisco Bay shellmounds with his chemical analysis of shellmound components, the results appearing in *AAE*, Vol. 12, No. 1. The following year Loud did some excavating in the Stege mounds (the site is now covered by wartime shipyards) and published in *AAE*, Vol. 17, No. 6. The next activity, seven years later, was by Loud at Tomales Bay and Clear Lake, but no publication resulted.

The presence of W. E. Schenck began a new phase of activity. With considerable insight, he and Gifford tackled the southern San Joaquin Valley area, doing a survey, some excavation and utilizing private collections. Their results appeared in *AAE*, Vol. 23, No. 1. Schenck salvaged what was possible of the old Emeryville shellmound when it was levelled by steam shovels in 1924 and his report (*AAE*, Vol. 23, No. 3) includes collections and data of earlier inves-

[1] For one of the first publications, see this issue, pp. 203–14. *Editor.*

[2] *University of California Publications in American Archaeology and Ethnology.* Cited hereafter as *AAE*. For additional background see *AAE*, Vol. 23, No. 3, p. 150; AMERICAN ANTIQUITY, Vol. 2, No. 2, pp. 108–16.

tigators. In 1924–26 partly through the enthusiasm aroused by Schenck and with J. H. Steward and W. D. Strong, the middle Columbia River region was investigated, the results appearing in *AAE*, Vol. 29, No. 1. E. Nordenskiöld who lectured at Berkeley in the fall semester of 1926 became interested in California sites and conducted several excavations at the Johnson Mound (site C.6) on the Cosumnes River. He was assisted in the field, among others, by J. H. Steward, R. H. Lowie, R. L. Olson, R. L. Beals, and E. W. Gifford.

The most ambitious project undertaken to date by the Department of Anthropology was the two summer expeditions under command of R. L. Olson to the Santa Barbara mainland and island region in 1927 and 1928, of which only a summary of results has appeared (*AAE*, Vol. 28, No. 1). Work languished until 1934 when W. R. Wedel began weekend investigations in Bay shellmounds, and excavated the Howells Point site in the summer of 1935.

In the summer of 1936 R. F. Heizer and A. D. Krieger excavated Humboldt Cave, Nevada, and tested the large stratified Miller Mound in the middle of Sacramento Valley. In the 1937 season further Nevada work was done along the eastern border of the State resulting in the location of a number of sites and considerable collections. In addition the key stratified site (Windmiller Mound) was excavated on the Cosumnes River. 1938 saw additional Delta and Valley sites excavated (Orwood, Hotchkiss, McGillivray, Blossom Mounds).

In the academic year 1939–40, G. W. Hewes conducted week-end explorations and spent the summer making an archaeological survey of the middle San Joaquin Valley. Heizer dug Drakes Bay shellmound sites in 1940 and R. K. Beardsley carried on the project the following summer. This work yielded much information on local archaeological chronology and was particularly significant since the uppermost levels produced items of iron and porcelain traceable to a Spanish shipwreck of 1595. In the summer of 1941 T. D. McCown performed salvage operations in a large shellmound at San Pablo which was being graded down to furnish the site of a chemical plant. In the academic years 1940–41 and 1941–42 W. Weymouth, A. Treganza, and A. King surveyed and excavated the Round Valley area, Mendocino County, and in the summers of 1941 and 1942 with the assistance of F. Fenenga and C. E. Smith surveyed and excavated key sites in the Shasta Dam area, now covered by water.

After the interruption of the war renewed activity was marked by the appointment for the first time of an archaeologist to the Department staff (Heizer). The summer of 1947 was marked by three field expeditions, two to the Sacramento Valley led by Heizer and Russell Newman, the other to Topanga Canyon, Los Angeles County in charge of A. Treganza and C. Malamud (*AAE*, Vol. 44, No. 2). The Topanga excavations were jointly financed by the Anthropology Departments at Los Angeles and Berkeley.

Of special value have been the several cooperative archaeological projects in which the Department of Anthropology has participated. Among these are the excavation of the base of the flagpole at Monterey on which the American flag was first raised in California, the excavation of the foundation and millrace of Sutter's Mill at Coloma where gold was discovered in 1848, a survey of 1850-period stone and adobe buildings of the Sierran Gold Belt (Mother Lode) region, and a cooperative University-State Division of Parks excavation of an important site in Humboldt County. In these projects the special abilities of the archaeologist have been utilized to recover significant data on early State history.

The introduction of a week-end field methods course, lecture courses on North American archaeology, encouragement of students to carry out Museum research problems, and a summer field course for credit have now started the University on the path of continuing archaeological interest. The recent appointment of John Rowe to the staff further emphasizes the Department's interest in archaeology.

Between 1904 and 1930 there were published in the *AAE* series 13 papers on the archaeology of California, one of Nevada, and one of Oregon. These aggregate some 1,500 pages and 350 plates. Since 1930 emphasis has been diverted to the Latin American field, and between 1924 and 1945 there appeared in *AAE* and *Ibero-Americana* 12 archaeological monographs dealing with Peru, 5 with Mexico, and one with Venezuela, totaling 1,200 pages and 225 plates. With works in press and in preparation the *AAE* and *Anthropological Records* series soon will become more productive of archaeological reports on California.

A final word about funds spent in securing the Californian archaeological material may be of interest. Mrs. Hearst's private support of Philip Mills Jones' work between 1899–1902 amounted to just under $16,000. From 1902 to date the University, through the Department of Anthropology, has spent for archaeology nearly, but not quite, an amount equivalent to that advanced by Mrs. Hearst to Jones. Private donations for fieldwork in the period 1902 to date have not totalled over $4,500.

The University of California Museum of Anthropology contains, as concrete results of sporadic archaeological activity for nearly half a century, about 60,000 specimens plus the extensive Lillard Collection (*ca.* 20,000 pieces) and the Dawson collection (*ca.* 12,000 pieces). Skeletal remains number about 7,700, between a third and a half of these being complete skeletons accompanied by reasonably accurate find-data.

All in all the Department of Anthropology's record of archaeological activity has not been without important value and result. A solid basis for future work which will entail extensive reconnaissance and attack on intensive problems by the Survey has been formed by the past activities recounted above.

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August, 1948

DIET AND THE AGE OF CALIFORNIAN SHELLMOUNDS

In shell middens bones and shells are surviving indicators of the diet of the former inhabitants. Unless carbonized, the plants consumed leave no obvious trace.

A comparison of Californian and Fijian (Viti Levu Island) shellmounds reveals a striking similarity in the quantity of bone and an even more striking dissimilarity in the quantity of shell. In both areas bone constitutes less than one-half of one per cent of the weight of the mound mass. In Fiji shell constitutes on the average 13 per cent by weight, whereas the average in California is 52 per cent[1]—four times as great. The following speculations are based on these facts.

In view of the modern Fijian use of mollusks[2] as food the year around, this difference may have temporal significance. It seems to me that Californians and Fijians may be regarded as equally omnivorous, even though the former lacked and the latter have cultivated plants. It is said of Fijians, by others and by themselves, that they are uninterested in the fauna and flora of their islands unless edible. Ethnological evidence indicates that the Californians thoroughly exploited the edible plant resources of their territory. It seems reasonable to assume that foods from the plant world entered about equally into the diets of the two peoples. Admitting this assumption, it follows that the balance of the food was derived from the animal kingdom. If so, then why the vast difference in the quantity of shell in the middens of these two shellmound peoples?

I suspect that one reason may be in differences of purpose, and duration, of occupancy of the shell middens in the two countries. In Viti Levu with its cultivation, occupancy of a site was continuous, unless interrupted by warfare. For the two defensible sites from which my data are derived, tradition states that there was no break in occupancy.

Owing to the early displacement and extinction of the coastal Californian population, we do not know if occupancy of shell middens was for the year around or only seasonal. I suspect that it was the latter and that people moved inland as certain wild crops became available. One bit of ethnological evidence supports this view. The Coast Yuki of Mendocino County, California, lived on their shell middens only six months a year, and spent the other six months inland.[3] This did not mean that they went without molluscan food a half of each year, for they transported inland quantities of dried mollusks.

My guess is that the Coast Yuki exemplify what was happening, in some measure at least, all along the Californian coast, except perhaps on the islands in the south. The huge disparity between the Fijian and Californian molluscan contents of shell middens suggests that the Californian concentration may have been due to seasonal visits in which the whole population devoted itself largely to gathering mollusks, thus amassing shell more rapidly in relation to other mound constituents. If this view could be supported with more convincing evidence than just the Coast Yuki example, it would mean that the age estimates now based on assumed year-round occupancy would have to be doubled.[4] If the assumption of similar balance between plant and animal in the diets of the two peoples is true, this would lead to even greater increase in the age estimates for Californian shellmounds. Needless to say, other factors enter into the problem, which is not so simple as implied by my remarks.

[1] Gifford, 1916, pp. 15, 17, 18.
[2] Steadman, 1941.
[3] Gifford, 1939, pp. 296, 326, 329.
[4] Nelson, 1909, p. 345; Gifford, 1916, p. 13; Cook, 1946, p. 50.

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ADDITIONAL DATA ON CRANIA FROM THE WARREN MOUNDS, UTAH

Since publication of the manuscript "Crania of the Warren Mounds and their Possible Significance to Northern Periphery Archaeology,"[1] it has become necessary to call to the reader's attention important data overlooked in the original report by both Mr. Enger and myself.

As was stated in the general summary of the Warren crania,[2] "The Warren crania have the following characteristics: cephalic index, brachycephalic; height-length index, chamaecephalic to orthocephalic; height-breadth index, tapeinocephalic; facial index, mesene; high orbits; a fairly well-developed occipital region; *and no occipital deformation.*" It is this last descriptive statement which, in view of recent studies, is in need of elaboration.

To the casual reader the phrase, *no occipital deformation*, may be assumed to mean that no cranial deformation of any type is to be found in the Warren series; however, this is not the case. Several varieties of cranial deformities have been described by Hooton[3] in the Pecos area; but only one of these need be of concern at present, that which has been termed "lambdoid"[4] deformation. Unlike the more common occipital deformation, in which the flattened plane is approximately at right angles to the Frankfort Horizontal, the lambdoid form of deformation has the plane inclined at

[1] Enger and Blair, 1947.
[2] *Ibid.*, p. 144.
[3] Hooton, 1930, p. 37.
[4] *Ibid.*

angle of 50°–60° to the horizontal, the lambda forming the center.[5]

This specific (lambdoid) type of deformation has been noted by T. D. Stewart to be present in at least one cranium of the Warren series (No. 20593, described as burial No. 1 in the original manuscript). Dr. Stewart, who at the present time has the Warren crania in his possession for further study, kindly prepared the accompanying sagittal-line drawings of two crania, one (Fig. 60, *a*) from the Warren site with lambdoid deformation, the other (Fig. 60, *b*) found associated with a known Puebloid site at Kanosh, Utah, and undeformed. Comparison of the two drawings will amply demonstrate the lambdoid deformity. For further comparison the reader is referred to illustrations of Pueblo skulls showing lambdoid flattening, particularly as displayed by T. D. Stewart[6] and J. O. Brew.[7]

This comparison brings out strikingly the difference in vault height between the Warren deformed type and the Pueblo deformed type.

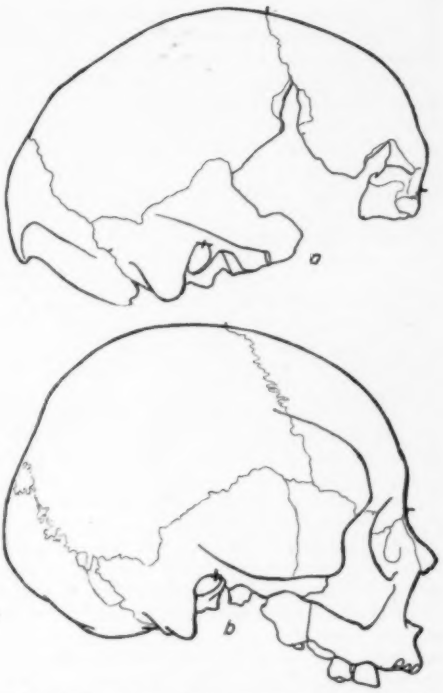

FIG. 60. Crania from Utah: *a*, specimen with lambdoidal deformation, from the Warren site; *b*, undeformed specimen from a Puebloid site at Kanosh. Both are arranged on the Frankfort horizontal. University of Utah catalogue numbers: *a*, 20593; *b*, 10861.

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July, 1948

ON THE CATLIN MARK

In this journal (Vol. X, No. 14, pp. 348–52, April, 1945), William H. Goldsmith contributes an article entitled "Trepanation and the Catlin Mark," in which he confuses these openings. The trephining operation of prehistoric people and the anomalous openings in the vault of the skull, such as the Catlin Mark, differ widely both in location and nature.

Goldsmith's article would lead one to infer that examples of the Catlin Mark are quite common and, furthermore, that they are labeled as trephine openings in many museum specimens. Pendergrass and Pepper have reported more cases of the Catlin Mark than any other observers, although they are not the exclusive writers on this subject. The articles by these two authors, the first of which, "Hereditary Appearance of the Large Parietal Foramina," appeared in the *American Journal of Roentgenology* in January, 1936 (Vol. 45, No. 1, p. 1), and the second, in the same journal, March, 1939 (Vol. 41, No. 3), would also lead one to think that the hereditary Catlin Mark is of fairly common occurrence. This, however, is not the case. In thirty years' experience, in which the writer examined the X-ray films of the skulls of well over 15,000 individuals, not once was the Catlin Mark recognized. The skulls were radiographed by the usual conventional technical practice, which consists always of stereoscopic films with antero-posterior and postero-anterior views. It is hard to believe that, if the anomaly existed in this material, it would not have been recorded.

For reasons that need not be gone into, all of the films of the skulls have been examined at least twice by the writer. In the Robert J. Terry Osteological Museum of the

[5] Stewart, 1937, pp. 169–71.
[6] Stewart, 1940, pp. 153–66, Pls. 52–55.
[7] Brew, 1946, Fig. 190.

Washington University School of Medicine, not one example of the Catlin Mark was found; this collection consists of some 1,500 skulls. In X-ray and physical examinations of the skulls of some 200 Mound Builders collected from Illinois, Missouri, and Arkansas and kindly lent the writer by Dr. Paul Titterington, of St. Louis, not a single example of either trephining or the Catlin Mark was discovered. In such museums as the writer has visited, the Catlin Mark has not been observed. These include the National Museum, the American Museum of Natural History, and the Field Museum of Chicago. I believe that in the first-named, there was an example of trephine openings which were unmistakable and unilateral. The trephine openings in the skulls of antiquity are rare, and the Catlin Mark is even rarer.

To consider that the Catlin Mark serves as a point of emergence for emissary veins seems most improbable, though the vein may traverse the opening. The Catlin Mark recorded in the literature mentioned above is of a size sufficient to take the entire sagittal sinus at its widest point on one side, alone. They are, therefore, not for the purpose of draining the venous blood from the cranial cavity.

The writer is constrained to believe that when the Catlin Mark is found, it is an incomplete example of "symmetrical thinning of the parietal bone." There are seven examples of this in the Robert J. Terry Osteological Museum. It is not too rare a finding in the X-ray examination of the skull in a clinical department, two having been recorded in the past three years. In the Robert J. Terry collection of skeletons, there are a number of calvariae with openings of one sort or another. They were obviously produced by penetrating trauma or disease, the nature of which could not be determined, but they were all unilateral.

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UN VASO "THIN ORANGE" DEL PAIS CARANQUI, ECUADOR

Hace quince años dió a conocer el Dr. Max Uhle un vaso proveniente de la hacienda "Cusín," situada a las orillas del lago San Pablo, parraquia de San Pablo, Cantón de Otavalo, Provincia de Imbabura, República del Ecuador, que calificó de figura legítimamente Maya, pero la comparó, desgraciadamente, con objetos y relieves que si con él tienen alguna afinidad no eran, por cierto, los más adecuados para convencer a los americanistas de la verdad de lo que él afirmaba.[1] La publicación hecha por el Dr. Uhle ha pasado, por lo que sabemos, inadvertida; así hemos creído oportuno hacer una nueva descripción del vaso de "Cusín," que hemos podido reexaminar, prolijamente, gracias a la gentileza de la Sra. Dña.María Lasso de Eatsman Cox.

Es una vasija formada por un recipiente barriliforme de 169 mm. de alto y de 149 de diámetro, al cual va adosada una figura humana espléndidamente modelada, con las piernas cruzadas y las manos apoyadas en las rodillas (Fig. 61). La cabeza sobresale al borde del recipiente con 111 mm.

La figura humana guarda magníficas proporciones vista por delante, pero tiene una espalda deforme, ya que el recipiente no es, como dice Uhle, un vaso que lleva acuestas, sino el mismo tórax del portador; así no hay un cordel que lo sostiene, sino lo que se ve en el reverso es el mismo cinturón del taparrabo, único vestido del personaje representado, fuera del hermoso gorro que lleva en la cabeza. Ni los brazos, ni las piernas se comunican con la vasija y en éllos, así como en el occipucio de la cabeza, hay huecos hechos para dar salida al aire durante la cocción.

Las paredes del recipiente tienen 8 mm. de espesor, el barro está recubierto de un englobe fino y bien pulido, pero no brillante, un poco más oscuro que la pasta sin él. Su color, de acuerdo con la nomenclatura de Ridgway,[2] es Orange Cinnamon (13 OY–O). Los adornos en relieve que hay en el gorro, la boca, las manos, y los pies de la estatua están recubiertos de un englobe, finísimo, tan pulido que resulta brillante, de color Rojo-Garnet-Brown (3.0-R, k).

Al tacto el vaso ofrece una contextura uniforme suave, pero no jabonosa. Las pequeñas roturas que hay en el borde del recipiente tienen un aspecto concoide de loza.

Esta preciosa vasija fue encontrada hace unos treinticienco años, por un campesino del pueblo de San Pablo, después de un fuerte aguacero, junto a la quebradilla vecina al camino que va de la población a la hacienda de "Cusín," a cuya propietaria, la Sra. Dña. Clementina Chiriboga de Lasso, lo vendió. Esta dama, persona de exquisito gusto, pero no coleccionista de antigüedades, lo guardó, desde entonces, con estima.

La procedencia de "Cusín" y el que no se trata de una importación postcolombina al Ecuador, son, pues, hechos que están fuera de toda duda. Es así mismo cierto que no proviene de una "Tola"-pirámide de tierra, sino de uno de los muchos sepulcros profundos—pozos—que hay en Imbabura.

Basta una comparación, aún sumaria y rápida de la figura con que illustramos este trabajo (Fig. 61), con las publicadas por Kidder[3] de vasos "Thin Orange" de Kaminaljuyu, Toluca, y Xalixintral, así como la reproducción del otro de Teotihuacán, dado a conocer por Seler,[4] para que no quepa duda de que el vaso de "Cusín" fue fabricado en Meso-América. No sólo hay igualdad en la concepción general del vaso, la posición de los brazos y de las piernas, sino que hasta los detalles del tocado son semejantes.

"Thin Orange," como lo llama Kidder, o "Fine Orange," como lo designa Brainerd,[5] es un barro especial que tiene una amplia difusión en México y Centro América. Este autor distingue dos tipos, el X y el Z. La primera tiene un acabado de superficie muy liso, que llega a lustroso; al tacto es rugoso, no jabonoso, y lleva, a menudo, un englobe ligeramente más oscuro que la pasta. La fractura es seme-

[1] Uhle, 1933, pp. 16–18.

[2] Ridgway, 1912.

[3] Kidder, 1946, Figs. 192, *a–f;* 194, *b;* 195, *a.*

[4] Seler, 1915, Pl. LIII: 4.

[5] Brainerd, 1941.

FIG. 61. Vaso de "Cusín," Ecuador.

jante a la de la China, concoidal, como de silex; el color, Vinaceous Cinnamon o Orange Cinnamon; el grueso de las paredes, de 5 a 10 mm. Claramente el vaso de "Cusín" pertenece, pues, a la variedad X.

"Thin Orange" hay desde Copán hasta Puebla; su centro de fabricación se desconoce, pero no su edad. Este barro, en pequeño número, se encuentra en Uaxactun, en la fase Tzakol; en Copán, en los periódos preacrópolis e intermedios; pero pertenece a la cultura Teotihuacana, a las épocas II, y III de Teotihuacán.[6]

[6] Kidder, 1946, pp. 198, 239.

En el actual estado de nuestros conocimientos de la arqueología de Imbabura y el Carchi, o sea del país Pasto y el país Caranqui, podemos bosquejar el Cuadro 15.

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CUADRO 15. CRONOLOGÍA DE IMBABURA Y CARCHI, ECUADOR

Pais Pasto	*Pais Caranqui*
1. ?	1. Cerámica con fino englobe rojo, brillante y decoración grabada.
2. Cerámica negativa a tres colores, cerámica blanco sobre rojo. (Epoca de Tuncahuán, estilo horizonte en el Ecuador.)	2. ?
3. Cerámica negativa a dos colores, sin englobe. Sepulcros en pozos.	3. Cerámica negativa a dos colores sin englobe. Sepulcros en pozos.
4. Cerámica positiva, café o rojo sobre crema. Sepulcros en pozos.	4a. Cerámica positiva, rojo sobre crema. Sepulcros en montículos funerarios.
	4b. Cerámica positiva, rojo oscuro sobre rojo claro. Sepulcros en montículos habitaciones.
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September, 1948

THE MAYA ECLIPSE TABLE OF THE DRESDEN CODEX: A REPLY

In his "Note on the Maya Eclipse Table of the Dresden Codex" (AMERICAN ANTIQUITY, Vol. XIV, p. 61, July, 1948) Dr. Satterthwaite "submits that we ought to have a demonstration" of the range of moon phase lengths, also of the three-day named tzolkin periods within which Robert H. Merrill locates on the one hand possible eclipses, and on the other the average three-day length of moon disappearance "if such a double function of the three-day groups is a possibility to be reckoned with."

On page 39 of AMERICAN ANTIQUITY for July, 1946, my Moon Chart (Fig. 7) was drawn with sufficient accuracy to show each lunation to scale in tenths of a day, for the arbitrary sample period 1900–33. This covers a like time span to that of the codex lunar table. To show in detail the simple calculations and the graphical accuracy, a sample work sheet is here appended (Fig. 62).

For a similar graphical approach the reader is referred to "The Graphic Time Table of the Heavens for 1948," reprinted on pages 31–36 of *Popular Astronomy* for January, 1948, which has also been published by the Maryland Academy of Sciences for each of the last 12 years.

Few Maya records survive, but certainly the Aztecs could locate for instance the day of the equinox. Quoting a citation from A. P. Maudsley "Motolinia says that the festival called Tlacaxipeualistli took place when the sun stood in the middle of Huicholobos, which was at the equinox, and because it was a little out of straight, Montezuma wished to pull it down and set it right. The priest and worshippers doubtless faced the east to watch the sunrise in the space between the two oratories at the equinox." We cannot answer Dr. Satterthwaite's question as to "just how gifted the much praised ancient Maya astronomer priests really were." The case may be stated that one full day of moon table correction accumulated every 34 lunations, whether recognized as such by the priests or not.

An analogy may be drawn from the length of the sun cycle wherein 1507 solar years may have been taken for exactly 1508 vague 365-day Maya calendar years. Even as a mere guess 29 calendar rounds of 52×365 days each, must have been recognized as a very close approximation, with which all recorded observations were found to be in precise agreement. Copan's "astronomical base-line" or any similar sunset horizon marker was tested for the annual day-counts 365–365–365–366 and confirmed this repeating series. One additional day every 4 years was required to keep the calendar in step with the sun, as a first approximation.

Perhaps at the end of a full calendar round the number-of-days calendar correction was determined to be 13 full days in 52 years, thus confirming the first estimate. On completion of a second calendar round, perhaps, instead of the expected $2 \times 13 = 26$ days of correction in $2 \times 52 = 104$ years, it was observed that 25 days was a better correction. We calculate in decimal numbers $104 \times 365 = 37{,}960 + 25 = 37{,}985$, and this divided by 104 equals 365.24; thus, as the record length grew, the astronomical constants became known quite exactly without involving any instruments of precision.

The first approximation to average lunation length was $59/2 = 29.5$ days. Thirty days was half a day too long, and 29 days was half a day too short, but when considered as balanced in alternating pairs the opposite errors canceled each other. "Even" six-moon groups might be made up of three balanced pairs, requiring only an exchange of a 29 for a 30 whenever the accumulated correction demanded it. Half-day corrections were available in two forms, first by merely shifting a group partition to enclose 5 instead of 6 moons, and second by changing the order from "odd" to "even" because starting with 30 is half a day greater than 29.5 (the unbroken alternation), while starting with 29 is half a day less than 29.5 days.

All nine 148 day groups preceding the 9 pictures are 148 days long, and if the alternation requirement is also retained, but one solution is possible, namely 30–29–30–29–30 = 148. Considered in the unbroken alternation, the group length was $5 \times 29.5 = 147.5$ days, and a $148 - 147\frac{1}{2} = \frac{1}{2}$ day correction has been applied. At the 178-day moon-groups a full day is apparently added as a correction, but if the order is reversed from odd to even, the correction is only half a day. Thus at least half a day correction must be applied at the 178-day groups while the other half may be placed wherever desired to fit best with actual moon observations.

What Dr. Satterthwaite terms "the true average moon" is the straight-line mean 29.5306 days per lunation of Schram's tables. Actual moon lengths, when plotted, fall slightly over or short of this straight line. The sample work sheet here shown (Fig. 62) gives the actual moon lengths, which are seen to be in groups, all 6 moons less than 29.5 followed in turn by approximately 6 moons all greater than 29.5 days long. Thus when accumulating excesses over 29.5 reached 1.31 days, the next period showed deficiencies amounting of 0.89 days. The net to be corrected then is $1.31 - 0.89 = 0.42$ days. The extreme range extending from $+1.31$ to -0.89 is 2.20 days, very like Teeple's example on page 47 of his *Maya Astronomy*.

The same three-day period not only defines the phase of no visible moon, it also marks the limits within which

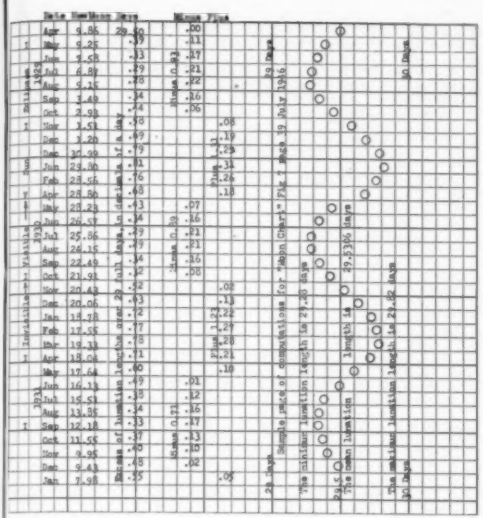

FIG. 62.

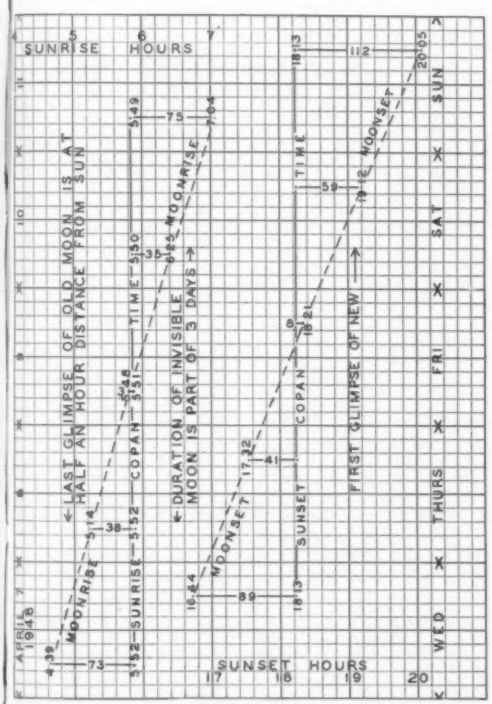

FIG. 63.

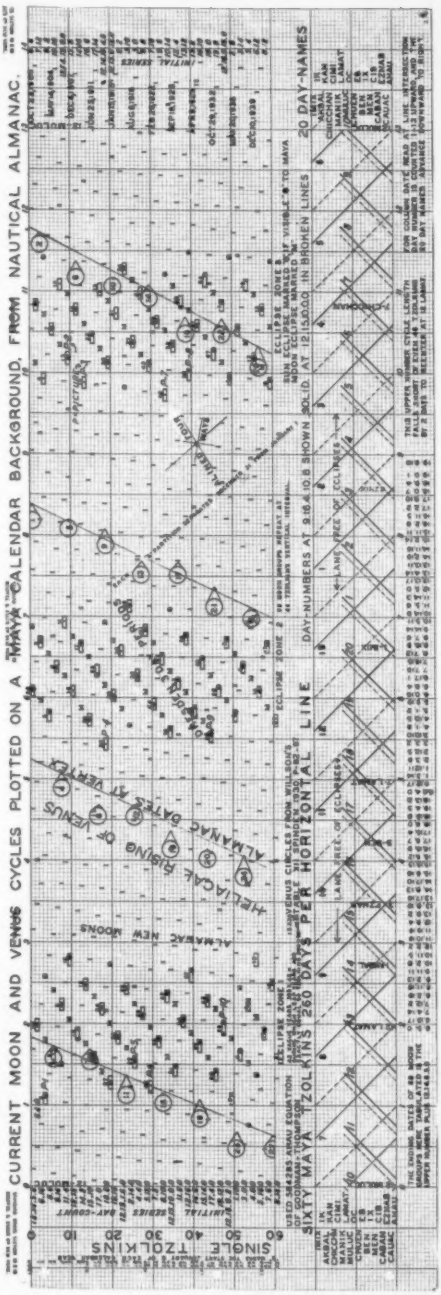
CURRENT MOON AND VENUS CYCLES PLOTTED ON A MAYA CALENDAR BACKGROUND FROM NAUTICAL ALMANAC
SIXTY MAYA TZOLKINS 260 DAYS PER HORIZONTAL LINE
SINGLE TZOLKINS
20 DAY-NAMES
DAY-NUMBERS AT 9.16.4.10.8 SHOWN
ECLIPSE ZONE
ALMANAC DATES OF VENUS
ALMANAC NEW MOONS

FIG. 64.

sun eclipses, if any, will be found (Fig. 63). The codex three-day periods, when charted on a 260-day tzolkin background (Fig. 64), fall into the same pattern found to fit the sun eclipses over the trial period 1900–1943. Teeple's Figure 18 (*op. cit.*, p. 89) illustrates how the lunar dates group into three sections, A, B, and C in the double tzolkin. The ending 12 Lamat is in section A, the beginning 7 Chicchan falls in section B, and 2 Ik (following 1 Imix) starts in section C. On page 91 he says, "This is surely a table of new moons in groups, so arranged that a group will end on a possible date for a solar eclipse." The codex table data secure a wider spacing when replotted as a cylindrical diagram with 260 days per horizontal line. Plotting 60 lines, new moons located to tenths of a day, shows that within the three-day boxes fall not only the phases of no visible moon, but also all solar eclipses, if any.

The emphasis on 15-day intervals peculiar to codex pages 51a and 52a without doubt relates the moon eclipses marked *M* on the tzolkin diagram to the sun eclipses. No dreaded eclipses of either sun or moon need be watched for in the three eclipse-free time zones between Teeple's sections A, B, and C. Straight lines projected through the new moon days of the past need only be prolonged into the future, and where all four such straight lines intersect, the desired new moon day of the future is easily located to the nearest day.

In the words of Dr. Spinden (p. 164 of *The Maya and their Neighbors*), "A celestial ephemeris can be kept before writing by tagged beads on strings. Such bead records will disclose in visual patterns a basic order in heavenly phenomena and lead to other recording devices."

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September, 1948

THE DARK PHASE OF THE MOON AND ANCIENT MAYA METHODS OF SOLAR ECLIPSE PREDICTION

In this short paper the aim is to eliminate from consideration what seems to me a misleading lack of precise statement—if not an actual and important error in astronomical fact—in the recent writing of Robert H. Merrill. It seems proper first to make clear my conviction that laymen in astronomy have a proper place in the study of ancient Maya astronomy, even if mistakes are sometimes made which must seem naive to a professional astronomer. Merrill is by profession a civil engineer, and I am a garden-variety archaeologist. As a matter of fact, laymen are probably responsible for more sound progress in this field than are the all-too-few professional astronomers who have become interested. The names of Förstemann, Morley, Guthe, Teeple, and Thompson come to mind at once.

It is necessary, I think, to discover how the ancient Maya astronomer-priests actually operated from day to day, month to month, and year to year. This is interesting in itself, and may help reduce the ambiguities in the aboriginal documents to a point where the "stretch" does not permit use of the same material in favor of varying correlations of Maya and Christian chronology. This point has not been reached as yet. The correlation problem is not solely an astronomical one, and it evidently cannot be solved as such. It has to do also with magico-religious concepts and habits in calculating and recording, and with artificial as well as astronomical cycles. One must be on the look-out for the effects of only partially true knowledge on the part of the Maya, and of pure historical accident.

This situation invites professional astronomers to move into the middle ground of documentary, archaeological, and ethnographical data, as Makemson has recently done in proposing a new "12–9" correlation, after seeming to have resolved the astronomical difficulties with Thompson's version of an "11–16" correlation.[1] It also invites anthropologists to understand and make use of facts on the level of naked eye observational astronomy. This applies to archaeologists, who want the correlation problem solved, and who want—or should want—to reconstruct the ancient Maya culture as completely as is possible. It applies to ethnologists interested in Middle America, for in favored spots at least parts of the ancient calendrical complex survive, and at least solar and lunar observations are being made. In this middle ground, where everyone must be a layman in something, mistakes will be made.

Merrill has stated in fairly clear language that the moon regularly passes through a 3-day period of invisibility, and has suggested that when the Maya author of the Dresden Codex set down 69 groups of three sequent tzolkin days, these days were not only meant to locate the limits within which solar eclipses were to be feared but also they "may represent," i.e., these groups of tzolkin-day designations may have "named," the days of this period.[2] I questioned this,[3] and now receive a copy of a further communication, appearing on pp. 228–30 of this journal, in which the proposition is reaffirmed. I quote his latest statement, adding italics and words in brackets which make my understanding of it more explicit.

> "The *same* three-day period [of Maya Tzolkin-calendar days] not only defines [locates in the Tzolkin-calendar] *the* phase of no visible moon, it also marks the limits within which sun eclipses if any will be found [since conjunction-day is always a dark moon day, and solar eclipses occur only at conjunction]."

The moon, weather permitting, will be last seen shortly before dawn, and will be first seen to reappear shortly after a sunset. The *time-distance* between these observations (which I will call "Visible Old Moon" and "Visible New Moon") must therefore include a large fraction of a day—somewhat more or somewhat less than 0.50 day. A "three-day" dark-moon phase must therefore be in terms of calendar days, and the suggested function for the codex three-day groups also makes it certain that it is three calendar days which are supposed to be dark. It is further necessary to understand that these three days of no visibility, which I will call "Dark Days," recur regularly, lunation after lunation. Otherwise it would not be suggested without special demonstration that the 69 3-day groups of the Codex, out of a possible series of 405 conjunction-containing groups, define "the phase of no visible moon."

[1] Makemson, 1943, 1946.
[2] Merrill, 1946, p. 35; 1948, p. 264.
[3] Satterthwaite, 1948, p. 62.

So much for the proposition. No demonstration is provided in this latest communication. I am particularly interested in this implied regular 3-day dark phase because of a paper in press in which it is argued that, in the lunar series of the Maya monuments generally, we shall probably be able to detect shifts between the days of visible old and visible new moon as zero days in the moon-age count.[4] Involved is the problem of how many days of shift this would mean, so far as the lunar prediction mechanism is concerned. I think all are agreed that predictions of the day of zero-age (and of days of any given age) were made by means of patterns of 29-day and 30-day formal lunations in which these two types ordinarily alternated regularly; and I think it is also agreed generally that the 3-day groups of the Eclipse Table of the Codex were located by the ancient Maya by means of such formal lunations, the regular alternation being modified according to some rule. In respect to this Eclipse Table we want to know whether sometimes (or always?), with perfect observation in perfect weather, there would have been 2-day dark periods made up of the first two or of the last two of the three days predicted for conjunction.

A fair search in text-books intended for laymen provides much information on the causes of the moon's phases, but none on just when it ought to be seen. Weitzel, evidently well-informed, if not actually a professional astronomer, has published a study of the question of visibility of new moon for particular Maya dates, a correlation being assumed.[5] He uses a preliminary rule-of-thumb which I am sure can be reversed without serious error, on the assumption that approximately equal negative ages of the moon just before sunrise and positive ones just after sunset give limits beyond which the moon surely would or would not be seen under good weather conditions. Applying this rule to conjunction-dates selected from a few given by Merrill makes it possible to show the presence of 2-day rather than 3-day dark periods, though I am well aware an astronomer would consider the analysis an exceedingly crude one. It seems sufficient for the purpose in hand.

TABLE 16. EQUIVALENT DATES

	Greenwich M.C.T.	*Cuchumatan M.C.T.*	*Julian Day*	*Cuchumatan "6 P.M." Tzolkin Days*
	1932 Mar. 14.00	1932 Mar. 13.75	2,426,780.00 −804.00	38.00 (12 Eznab)
	1929 Dec. 30.00	1929 Dec. 29.75	2,425.976.00 .99	14.00 (1 Ix)
A	Dec. 30.99*	Dec. 30.74	2,425,976.99 29.81	14.99 (1 Ix)
	1930	1930		
B	Jan. 29.80*	Jan. 29.55	2,426,006.80 29.76	44.80 (5 Kan)
C	Feb. 28.56*	Feb. 28.31	2,426,036.56 29.68	74.56 (9 Ix)
D	Mar. 30.24*	Mar. 29.99	2,426.066.24 29.56	104.24 (13 Kan)
E	Apr. 28.80*	Apr. 28.55	2,426,095.80	133.80 (3 Ben)

* Conjunction-days and times from *American Ephemeris and Nautical Almanac*, times converted to fractions of 24-hour day.

EXPLANATION OF TABLES

The starred dates in Table 16 give conjunction points from the American Ephemeris, with the hours and minutes converted to hundredths of a 24-hour day, the day of civil mean time. There was an eclipse at the conjunction labeled *E*, which Merrill says was visible, presumably meaning visible in Maya country. The third column equates the date of the Ephemeris with its corresponding Julian Day number, which gives the position in a day-by-day count of the astronomers. This is like the Maya Long Count in that it starts from a zero point projected far back into the prehistoric past. Mechanically these Julian Day numbers differ from the Maya ones only in the fact that their arithmetic is purely decimal, and we are using decimal fractions of them, while the Maya Long Count numbers behave ac-

[4] Satterthwaite, n. d.

[5] Weitzel, 1935, p. 19.

cording to a modified vigesimal rule, and recorded ones are innocent of fractions of a day, unless these are concealed in undeciphered glyphs.

The first and third columns always show the same time of day, since in each case this is in Greenwich mean civil time. The Cuchumatan mountains of Highland Guatamala are 90° west of Greenwich, so the midnight of Greenwich (March 14.00) equals 6 P.M. of the previous day in local civil time in these mountains (March 13.75). Now we know that a tzolkin day *12 Eznab* (substituting the equivalent Yucatecan Maya day-name for the local one) began at sunset, March 13, 1932.[6] So, if we are willing to disregard the fact that sunsets and sunrises do not stick precisely to 6 P.M. (0.75) and 6 A.M. (0.25) we can say that these modern tzolkin days coincide with Greenwich-time Julian days. Now if we measure the time of day in a local tzolkin day, we should count it from its beginning, and it must be the same as the time of day at Greenwich. The fourth column provides this equivalence in time of day, as a decimal fraction following the number of the tzolkin day which is named to the right. Since these names run through a cycle of 260 and then repeat, the tzolkin-day numbers which we apply for convenience run from 1 to 260 and then start with 1 again. The numbers are more easily tabulated than the names, and (like the Julian Day numbers) they reflect time-distance more clearly.

The tabulation starts with the equivalent dates for the assumed 6 o'clock sunset of March 13, 1932, proceeds back to another at Dec. 29, 1929, then comes forward 0.99 days to reach the time of conjunction according to the Almanac. Thence we proceed by the steps indicated in the Julian Day column from Conjunction A to Conjunctions B, C, D, and E. Of course, all columns must change in unison so, in the right column, we have the number of the tzolkin day, and the fractionally-expressed time in it when each conjunction occurred. For example, the eclipse of Conjunction E was at its maximum when 0.80 of the day *3 Ben* had passed. This requires only whatever correction is necessary to allow for the fact that the sunset which brought in tzolkin-day *3 Ben* did not occur exactly at 6 P.M. according to the civil-time clocks of the local Ladinos. It does not matter here whether the ancients would have placed this eclipse in the day after *2 Eb*.[7]

With this fourth column we are prepared to reason from readily obtainable times of astronomical phenomena, the times being approximately correct for modern functioning Maya tzolkin days. But it must be remembered that modern (hence probably ancient) Maya days are not counted from midnight or noon, in either apparent or mean local time, but from observed sunset. Such days oscillate back and forth against a pattern of mean civil or of apparent solar (sun dial) days. The Maya country is within the tropics, but north of the equator—about 15° for the Cuchumatans. So only at the equinoxes of March and September will sunsets be at about 6 P.M. local civil time, with sunrises at about 6 A.M. in that time, that is, at decimally expressed times 0.00 and 0.50 respectively, in the tzolkin days. For border-line cases, as the problems may require, correction should be made for actual sunset and sunrise time. The times of the fourth column are for a fictitious "6 o'clock" tzolkin day, somewhat as civil mean times are in a fictitious average day. I am not sure whether others may have made use of this fiction. Certainly it can be very useful, if its nature is remembered.

In order to test the regular 3-day dark-period postulate I think we can use these "6-o'clock" times without correction. Adjustments of only plus or minus 0.05 day would account for settings and risings an hour and twelve minutes before or after 6 o'clock, and not much more would be sufficient for the latitude of Philadelphia, 25° further north.

Table 17 is exceedingly simple. Each conjunction-time, in "6 o'clock" tzolkin days, is set out several times in a horizontal row. We then subtract or add to reach 0.50 of a day (a fictitious sunrise) in the conjunction day and in one or two days before it. We also add to reach 0.00 time in the day-after-conjunction day, at a fictitious sunset, and in one or two days following. What we subtract gives us minus moon ages at the fictitious sunrises, and what we add gives us positive moon ages at the fictitious sunsets. Old moon should have been visible shortly before the real sunrise not

TABLE 17. TZOLKIN DAYS OF VISIBLE OLD AND VISIBLE NEW MOON

A		14.99	14.99	14.99	14.99	14.99
		−1.49	−.49	.01	1.01	2.01
		13.50	14.50*	15.00	16.00	17.00
		VO	D	D	?	
B		44.80	44.80	44.80	44.80	
		−1.30	−.30	.20	1.20	
		43.50	44.50*	45.00	46.00	
		VO	D	D	VN	
C	74.56	74.56	74.56	74.56	74.56	
	−2.06	−1.06	−.06	.44	1.44	
	72.50	73.50	74.50*	75.00	76.00	
		?	D	D	VN	
D	104.24	104.24	104.24	104.24	104.24	
	−1.74	−.74	.26	.76	1.76	
	102.50	103.50	104.50*	105.00	106.00	
		?	D	?		
E		133.80	133.80	133.80	133.80	
		−1.30	−.30	.20	1.20	
		132.50	133.50*	134.00	135.00	
		V	D	D	V	

* 6 A.M. of conjunction day, Cuchumatan Local Civil Time.

[6] La Farge, 1934, p. 115.

[7] It is often said that the ancient Maya counted in elapsed-time style only. I believe this is incorrect as to certain periods, and uncertain as to tzolkin-days. See Satterthwaite, 1947, pp. 40–8.

far distant from one of the fictitious ones; and new moon should have been visible shortly after a real sunset corresponding to one of the fictitious sunsets. The question is, which?

With two exceptions these are picked out by the following rule of thumb. If the positive age is 0.67 to 0.99 day, the sunset is question-marked; if 1.00 day or more, "VN" means that new moon should have been seen. This rule is from Weitzel, who applied it for actual sunsets. The meaning of the question-marks on the right side is that calculation might require substitution of a "D" for "dark day"; or it might require substituting a "VN" for visibility. Question-marks and "VO" for visible old moon have been applied by reversing the rule, i.e., where the corresponding negative ages at fictitious sunrises fall within the same limits. This mechanical reversal of a rule for limits of visible new moon doubtless introduces a new source of error, due to differences in the speeds with which the moon approaches the sun after last quarter, and then leaves the sun during first quarter. In Young's *Astronomy* we learn that these variations are at zero at the time of conjunction itself, and when at plus and minus maxima have a time effect one way or the other of about an hour and twenty minutes (0.055 day). But the maximum differences do not appear when the moon is less than 45° from the sun, on either side.[8] So this source of error, to be added or subtracted to that resulting from use of 6-o'clock tzolkin days, need not be considered except in border-line cases. To be on the safe side, I have substituted "?" for "VN" for tzolkin-day 16.00, and "?" for "VO" for tzolkin-day 73.50, though the 6 o'clock ages were plus 1.01 and minus 1.06 respectively.

CONCLUSIONS

Unless I am hopelessly off the track, with good eyes watching in good weather, conjunctions B and E, the latter bringing an eclipse, fell in 2-day dark periods. In terms of local civil time, by 6 A.M. of the days before these conjunction days the moon still had 1.30 days to go before conjunction was reached; and the 6 P.M. near which a new Maya tzolkin-day entered after two dark days, it was 1.20 days since conjunction.

Whether 3-day dark periods also occur is not clear from such an analysis. It suggests that they do occur, in terms of 24-hour days. If not, one still wonders if they may not in terms of sunset days. I think a full expert exposition of the possibilities would be a useful tool in attempts to reconstruct the evolution of ancient Maya astronomy. But it seems probable that the Maya would sometimes fail to see the moon when theoretically they should see it, due to unfavorable conditions which they would not recognize, such as very slight haze or, at certain seasons, milpa smoke. Therefore, whatever the situation under uniformly ideal conditions, the best working hypothesis seems to be that the ancient Maya would expect either 2-day or 3-day dark periods. If the moon was invisible during more than three days, it seems a fair assumption that the Maya would know this was due to bad weather, forming their judgment on the thickness of the illuminated crescent, perhaps also on rough judgment of angular distances from the sun, when the moon was last and first seen.

I have suggested elsewhere that the 3-day groups of the Codex "were meant to allow for variation in the lunation," and that "all three rows of tzolkin dates would be needed to embrace the days of actual eclipses during the period covered."[9] This still seems true, but I think a better statement of the function of the 3-day groups would be a modification of Merrill's. Let us assume and test the working hypothesis that the 3-day groups were predicted to contain all the dark days, hence all the visible eclipses, which were feared in turn at each of the 69 selected lunations; but that it was known that when the group was reached in actual time, careful watching might prove the first to be in reality a day of visible old moon. However, if this was a dark day, with good weather at dawn, then careful watching might prove the last of the predicted days of danger to be actually a visible new-moon day.

This seems a proper place to repeat a suggestion in my as yet unpublished discussion of suspected shifts of the zero day of the age count. It seems a fair hypothesis to assume that when eclipse prediction began, it had been learned that eclipses (visible to the Maya) occurred only on dark days (and, of course, only during the daylight halves of them). Hence they *would* watch carefully at dawn of the first predicted dangerous day. If it turned out to be old-moon day, tension would be relaxed until the next dawn. On occasions when the first two days had been dark they *would* watch for new moon, as sunset brought in the third predicted day of danger. If found to be a visible new-moon day, a last (instead of a first) half-day of ceremonial readiness could be dispensed with, and there would also be immediate relief from the anxiety presumably felt during the dark hours preceding daylight ones so long as they continued to be feared.

An alternative hypothesis also requires consideration. Could the ancient Maya have worked out a pattern of formal moon corrections so that some of the dark days were excluded from the 3-day groups, but never those which were days of conjunction, and so might be eclipse days? I now suspect that they did so, and that a shift of the zero day of the calculating system from visible new to visible old moon would have been by three days, but that a shift aimed at eclipse dates would have been by two days.

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October, 1948

BOOK REVIEWS

Anthropology A. L. KROEBER. New edition, revised 1948. New York: Harcourt, Brace and Company. 1948. xii +856 pages, 42 text figures, index (i–xxxviii). $7.50.

Three chapters or approximately a quarter of this book deal directly with archaeology, or more accurately, with culture history. Geographical and chronological coverage is complete and represents a tremendous distillation of source material. The organization is based primarily on degree and direction of cultural advancement and secondarily on geography, as shown by the chapter headings (The Beginnings of Human Civilization, Later Prehistory and Ethnology in the Old World, and American Prehistory and Ethnology). Early American cultures are discussed in the first chapter, rather than the third. The separation of later Old and New World prehistory in the second and third chapters is presumably an expression of Kroeber's conviction that the cultural traditions of the two hemispheres are substantially independent, and not a conventional subdivision.

A detailed appraisal of the summaries and interpretations, area by area and period by period, is a suitable task for a corps of specialists. There are no doubt omissions and opinions based on something less than the last word of the students from whom the basic data were derived. It is the reviewer's feeling, however, that slips of this sort are neither numerous enough nor important enough to impair seriously the accomplishment of a unique synthesis. The importance of this synthesis does not lie in its comprehensiveness, although this is remarkable, but rather in the fact that it is a consideration of the entire range of human culture history by one of the most profound students of culture. As such, it offers a check on the interpretations of scholars with somewhat narrower interests and experience. Typical examples are the skepticism with which the currently fashionable long Palaeolithic chronologies are viewed, the explanation of the inadequacy of the river valley environment as a prime mover in the development of argicultural civilization, and the substitution of more realistic terminology and grouping for the Maya sequence. The preceding sections of the book devoted to a general analysis of cultural processes, together with the specific applications in the archaeological section, offer the richest available comparative material for the archaeologist who wishes to view his data in terms of inherently probably concepts.

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Grassy Island, Archaeological and Botanical Investigations of an Indian Site in the Taunton River, Massachusetts. FREDERICK JOHNSON and HUGH M. RAUP. Papers of the R. S. Peabody Foundation for Archaeology, Vol. 1, No. 2. Andover, Mass.: Phillips Academy, 1947.

Johnson and Raup present a well organized objective study of the archaeology and botany of Grassy Island, which is situated in the Taunton River near Dighton Rock in southeastern Massachusetts. The island is composed of a bed of peat overlying an amorphous zone which rests upon sand and gravel. Archaeological features and artifacts occur within the amorphous layer and in the upper portion of the sand and gravel. The surface which the inhabitants occupied "is now below water everywhere at mean high tide. Many places are submerged at mean low tide." If present conditions existed at the time the site was in use the occupants would have been able to stay there for, at most, two hours a day. The excavations reveal, however, that the people manufactured artifacts there and built fires in pits which are now below sea level.

Investigations in the Taunton River estuary show that the site could have been occupied when the high tide level was 40 inches lower than it is now. It is significant that on Grassy Island the high-tide grasses are limited to the upper 12 to 24 inches and mid-tide grasses occur below. On the island, but not on the mainland, an amorphous layer intervenes between the peat and the underlying sand and gravel. No explanation for this fact is made. The inclusion of artifacts and a pit in the layer suggests to me a humus zone which developed on the top of the sand and gravel before the inundation began. It is concluded on the basis of geological evidence that the island was once part of a low hummocky plain composed of sands and gravels of glacial origin. As the water level rose the plain became an uninhabitable salt marsh which was finally completely inundated and later was eroded by water currents. Grassy Island is regarded as the remains of one of two old ridges and the last to be inundated.

The currents are now exposing more and more of the archaeological horizon on the western side of the island, while deposition is occurring on the eastern side. A comparison of the present position of Grassy Island with its position on a chart dated 1875 shows an eastward movement of 50 feet. At this rate 600 years would have elapsed since the beginning of the movement. Further evidence for the age of the peat comes from observations of the water level in relation to Dighton Rock from the seventeenth century to date. A rise of one foot per century and an estimated age of 600 years for the peat is thus established. Furthermore, it is estimated that peat accumulates at a rate of 10 inches per century, thus indicating an age of 600 to 700 years. It is concluded, then, that the island probably became uninhabitable more than 700 years ago or at approximately 1200 A.D. The reader should bear in mind that this is the date *after which* the site could not have been occupied. It does not determine the date of abandonment. Conceivably, therefore, the site could have been occupied and abandoned several centuries prior to 1200 A.D.

The majority of the artifacts are projectile points, most of which are lanceolate while the remaining specimens are trianguloid. Those with bases modified for hafting predominate over those with unmodified bases. The points are divided into types bearing descriptive names such as "lanceolate, stemmed, straight base," a common variety at the

site, and "trianguloid, concave base," another frequent type. Other artifacts include drills, scrapers, gouges, celts, a notched ax, a netsinker, a chopper, and various unclassifiable fragments of worked stone. No pottery was found.

A comparison of the trait complex with other sites in New England, New York, and New Jersey reveals varied degrees of similarity. It is most closely related to the material found at the Hornblower site on Martha's Vineyard, a site containing Vinette Type 1 pottery. There is little in common with the data from sites in New York and New Jersey which were available for comparison.

The authors decry "the lack of an adequate chronology or even a date from which to begin reckoning time" in New England. They add that there is no reason to believe "that actual sequences in New England are the same as those identified in surrounding localities." They feel that it is impossible at present to establish a sequence based on artifact types for the purpose of relative dating. Contrary to the opinions of Johnson and Raup, recent publications suggest that although New England may be characterized by some traits and trait-complexes peculiar to itself, there is a thread of continuity with cultures and culture sequences found elsewhere in northeastern North America. I[1] have presented a sequence of cultures for southeastern New York which Rouse[2] has been able to apply to Connecticut and which Bullen[3] sees reflected in eastern Massachusetts. Bullen would place the occupation of Grassy Island at about the time when Vinette Type 1 pottery was being introduced into New England, or in his earliest ceramic period. This is based on typological resemblances between the stone artifacts of Grassy Island and those found on sites producing the early variety of pottery. With this I would concur, because the stone artifacts suggest affinities with the North Beach focus, the earliest ceramic culture in the area surrounding Long Island Sound. On the basis of the estimated age of the earliest pottery sites on the coast I would place the occupation of Grassy Island at approximately 700 A.D. In my opinion, there is a note of undue conservatism, if not pessimism, in regard to the establishment of cultural sequences in New England. However, the authors are to be congratulated on this addition to our knowledge of the archaeology of northeastern North America.

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Caves of the Upper Gila and Hueco Areas in New Mexico and Texas. C. B. COSGROVE. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. XXIV, No. 2. Cambridge, 1947.

This report covers the investigation of a series of over fifty caves in the Hueco Mountains and the Rio Grande Valley near El Paso; the Playas District; and the Upper Gila area in New Mexico. Architecture was absent from most of the sites. A few of the Upper Gila caves contained one- or two-room masonry structures, storage bins, and breastworks; and a single masonry structure was found in one of the Playas caves. Most of the walls were made of cobbles laid up in heavy adobe mortar, but one unusual variation consisted of a lower course of vertical, adobe-coated, slabs of wood or stone with cobbles above. A few storage pits were partially lined and floored with stone slabs. The majority of the caves showed no sign of use as permanent habitations. Mr. Cosgrove suggests that some served as temporary shelters or storage places and that others had a ritual significance. Collections from the latter appear to represent offerings such as the twelve hundred-odd worn sandals from Ceremonial Cave in the Huecos.

The bulk of the report is devoted to the specimens. This is the only large collection of perishable materials from the area, and the Cosgroves' meticulous description will be invaluable for comparative purposes. There are food remains, atlatls and darts, bows and arrows, fending sticks, and throwing sticks. Textiles include fur and feather cloth, several types of cordage, netting, and woven fabrics. Fourteen sandal types and sub-types are presented in great details, with numerous illustrations and diagrammatic renderings. Basketry and matting are well represented and minutely described, with a revision to current terminology by Earl Morris. A number of ceremonial objects such as *pahos* and *tablitas* were found, and there were also artifacts of leather, bone, and stone.

The Cosgroves have done one of the finest analyses of a body of perishable material which has appeared in print. Their descriptions of the various specimens are meticulous and detailed, and the presentation is one of the few which are really adequate for comparative purposes.

Many of the specimens are classified as "Basket Maker" or "Pueblo," but it must be remembered that this is strictly a matter of typology, as no stratigraphy was found in any of the caves.

In the Conclusions, the Hueco and the Upper Gila materials are grouped together as "Hueco Basket Maker," and Hueco Basket Maker is postulated as a southern variant of San Juan Basket Maker which later spread to the Texas Big Bend. This report was completed in 1934, just prior to Mr. Cosgrove's death, and there have been many changes in our ideas of Southwestern prehistory during the last fourteen years. It has been demonstrated that the open sites in southern New Mexico differ in many ways from those in the San Juan. Because of the contrasts between the two complexes, the southern materials are interpreted as representing a cultural tradition (the Mogollon) which is distinct from the northern Anasazi tradition. Since the cave materials reported here are certainly products of the same people who occupied the open sites, they must also be Mogollon rather than Anasazi. There are some parallels which may be due either to limitations of the materials, diffusion, or possibly to a heritage from a common ancestor. Today, we also recognize several branches of the Mogollon, including the Mimbres in southwestern New Mexico and

[1] Carlyle S. Smith, "An Outline of the Archaeology of Coastal New York," *Bulletin of the Archeological Society of Connecticut*, No. 21, pp. 2–9, New Haven, 1947.

[2] Irving Rouse, "Ceramic Traditions and Sequences in Connecticut," *Bulletin of the Archeological Society of Connecticut*, No. 21, pp. 10–25, New Haven, 1947.

[3] Ripley P. Bullen, "Culture Dynamics in Eastern Massachusetts," AMERICAN ANTIQUITY, Vol. 14, No. 1, pp. 36–48, 1948.

the Jornada in the El Paso district. Although the two areas shared the same basic Mogollon tradition, their culture histories are quite different. Therefore, the Hueco and Upper Gila materials appear to be distinct, products of two different lines of development. The exact relationship of the Hueco and the Texas Big Bend areas is still not completely understood. However, the Big Bend development has been traced back to post-Pluvial times, and there are only slight evidences of contact with the Hueco district prior to 1300.

Thus, on the basis of our understanding of Southwestern prehistory as of 1948, there is almost no evidence that the Hueco materials were derived from the San Juan. They are presumably Mogollon products, backed by a local tradition which extends into Pleistocene times, and further a tradition which had produced different branches in the Mimbres and Hueco areas. Neither of these branches appears to be closely related to the Big Bend developments.

A report of this sort presents the reviewer with a rather unusual situation. As Dr. Kidder points out in his Foreward, Mr. Cosgrove would have reached his conclusions on the basis of present knowledge if he had lived. The suggestion of alternative interpretations is in no way an implied criticism of Mr. Cosgrove, but only of a publication program which holds such a report in its files for over ten years.

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Coclé, an Archaeological Study of Central Panama: Part II, Pottery of the Sitio Conte and Other Archaeological Sites. SAMUEL KIRKLAND LOTHROP. Memoirs of the Peabody Museum of Archaeology and Ethnology, Harvard University, Vol. 8. xiii+292 pp., 491 figs., 3 colored plates. Cambridge, 1942. $8.00.

This is the second and final report on the excavations undertaken by the Harvard Peabody Museum at Sitio Conte in the Province of Coclé, Panama during the years 1930, 1931, and 1933. Like the first,[1] it is an impressive volume—large in size, lavishly illustrated, erudite, and replete with descriptive details. The volume does full justice to the relatively high technical and artistic level of Coclé pottery; it is in itself a work of art.

In classifying the pottery, Lothrop rejects the typological approach common to Southwestern and Eastern United States archaeology in favor of a broader classification in terms of wares. Techniques of manufacture and of decoration are used to define these wares. Within each ware, only those vessels are discussed which are complete. They are grouped according to form, and in the case of each form of vessel, there is a detailed analysis of design elements.

It is not uncommon in Central American and Colombian archaeology to classify in terms of complete vessels; the procedure is facilitated by the fact that graves usually contain whole pots. At Sitio Conte, though, relatively few of the mortuary vessels were found unbroken. The inhabitants of the site seem to have had the custom of "killing" the vessels by trampling on them. In addition, certain graves had been reopened for subsequent interment; others were disturbed by later graves which intruded into them; and still others had apparently been robbed to provide furniture for subsequent burials. As a result, it has been necessary to reconstruct the Sitio Conte vessels from sherds before proceeding with the classification. The slowness of publication is due to the length of time required for this arduous task.

The emphasis upon complete vessels has the advantage that the design elements can be discussed in terms of their layout on the vessels. It has also enabled Lothrop to compare the vessels detail by detail and thereby to distinguish groups of more or less identical specimens which seem to have been made by individual potters. On the other hand, it has presumably resulted in greater attention being paid to mortuary pottery than to utilitarian wares, since the latter are not so susceptible to restoration.

Three ceramic periods are recognized: Early, Late, and Decline. The first two are frequently mentioned throughout the volume; in fact, the two major wares, Early and Late Polychrome, are named after them. Since the periods themselves are not discussed until the end, and then only in terms of the mortuary pottery, this was a source of some confusion to the reviewer. A section defining the periods and placed at the beginning of the volume, would have made for easier reading.

The periods are based upon the superimposition of graves. In addition, Lothrop correlates the pots made by individual artisans which were found in different graves. By assuming that the average working life of a potter was forty years, he is able to estimate the maximum length of time which elapsed between the digging of different graves. Trade objects from other areas confirm that the site was inhabited from 1330–1520 A.D.

This use of the output of individual potters for determining the age of the site is an ingenious development and one which may well have wider application. We possess all too few techniques, however conjectural, for determining the duration of periods in terms of years.

As one whose work has been confined to midden sites, the reviewer would be particularly interested in knowing whether the refuse stratigraphy bears out the burial sequence. According to Part I of the Coclé report,[2] three "habitation levels" were encountered in the refuse deposits. These are not mentioned in the present report; instead Lothrop asserts that the digging of graves and subsequent floods have so churned the refuse that analysis of stratigraphy would be impossible. It is stated to the contrary in the first report[3] that "limited" stratigraphic studies of the refuse are possible. This, however, would require another type of classification, in terms of sherds rather than complete

[1] S. K. Lothrop, H. B. Roberts, M. Hutchinson, F. Johnson, W. C. Root, R. J. Gettens, and V. G. Mooradian, "Coclé, an Archaeological Study of Central Panama: Part I, Historical Background, Excavations at Sitio Conte, Artifacts and Ornaments," *Memoirs of the Peabody Museum of Archaeology and Ethnology, Harvard University*, Vol. 7, Cambridge, 1937.

[2] *Op. cit.*, Fig. 21.

[3] *Op. cit.*, p. 39.

pots, and might well be the subject of a separate, complementary report, utilizing the typological approach.

It is perhaps worth noting in this connection that the mortuary and utilitarian vessels are sharply distinct, the former being primarily polychrome and the latter, monochrome. From a functional standpoint, therefore, the two seem to form separate systems, a fact which increases the value of testing the chronology in terms of the utilitarian pottery.

Following the discussion of Sitio Conte pottery, there is a description of the ceramic collections from other sites in Coclé and neighboring provinces. It is concluded that Coclé pottery stands out as a distinct style comparable to those of Chiriquí and Veraguas to the west and Darien to the east. Polychrome pottery with elaborate curvilinear designs is particularly characteristic of Coclé.

In a brief concluding section, Lothrop compares Coclé pottery with that of Middle and South America. He places its origin in the south, although at the same time suggesting that the polychrome technique of decoration may be derived from Costa Rica. Here again, there is implied a distinction between the mortuary and utilitarian vessels. Is it possible that the two have had separate origins?

In view of Steward's recent postulation of a circum-Caribbean culture,[4] it is interesting to note that Lothrop finds no ceramic resemblances between Coclé and the north coast of South America. This leads him to repeat his earlier suggestion that the Arawak were the main agents of diffusion throughout northern South America.[5] Deriving them now from the eastern slopes of the Andes rather than the Orinoco Basin, Lothrop assumes that the Arawak subsequently moved east into Amazonia, northeast through the Orinoco Basin into the West Indies, and northwest into Panama, carrying with them the curvilinear style of ceramic decoration which is found in all four places but not on the intervening north coast of South America. In the reviewer's opinion, this is more likely to be correct than Steward's theory of circum-Caribbean connections—at least as regards the West Indies—but a more detailed and systematic study will have to be made before it can be considered more than a hypothesis.

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Northwest Argentine Archeology. WENDELL C. BENNETT, EVERETT F. BLEILER, and FRANK SOMMER. Yale University Publications in Anthropology, No. 38. New Haven, 1948.

El trabajo que comentamos constituye una revisión analitica de la arqueología del Noroeste Argentino, a través casi exclusivamente de la fuentes bibliográficas y una interpretación final de culturas y secuencias.

Uno de los autores (Bennett) visitó la Argentina en 1946 y estudió algunas colecciones en museos Argentinos. Es evidente que Bennett no pudo disponer de una amplia revisión de la famosa colección Muñiz Barreto del Museo de La Plata y de su respectiva documentación, donde es seguro habría encontrado bases para un distinto planteo de algunos de los puntos de su cuadro.

Northwest Argentine Archeology constituye un trabajo de seminario realizado en la Yale University bajo la dirección del Professor Bennett y asistido por los señores Everett F. Bleiler y Frank H. Sommer.

Es explicable que domine en el trabajo el pensamiento central del maestro y esto es provechoso ya que Bennett es sin duda uno de los mejores conocedores de las culturas Andinas. En la ordenación de períodos se sigue la secuencia cúadruple generalizada para el Perú y Bolivia de: Primitivo, Medio, Ultimo, e Inca. Sostiene Bennett en el capítulo de conclusiones que la revisión que han realizado demuestra claramente que "el Noroeste Argentino tuvo un desarrollo cultural característico y razonablemente independiente" lo que no es bovio señalar ya que "ha habido en el pasado una tendencia, que aún persiste, en negar tanto la independencia como la profundidad de tiempo." Reconoce que el desarrollo cultural del Noroeste Argentino, constituyendo parte del tipo Andino no es meramente una rama del costado o un reflejo marginal del Perú.

Las aseveraciones de Bennett son oportunas y ciertas, y es necessario meditar sobre ellas. Casi no hay arqueólogo que haya trabajado sobre el Noroeste Argentino que no haya recurrido a la cómoda muletilla no ya de las vinculaciones sino del origen Perú-Boliviano de nuestras culturas y nosotros mismos hemos incurrido alguna vez en este error. Si exceptuamos Inca y quizás una influencia secundaria o más lejanas aún del último Tiawanaco, las similitudes provienen no de interrelaciones sino del fondo comun Andino que es generalizado en casi todo el Oeste Sud-Americano.

Nos satisface estos puntos de vista no sólo porque son coincidentes con los nuestros sino porque al venir de tan autorizado autor podrán despertar interés en seguirlos.

En nuestra sintesis *Los Aborígenes Argentinos* repitiendo puntos de vista ya expuestos anteriormente por nosotros decíamos que "a lo largo del espinazo andino se desarrollaron diversas manifestaciones culturales entroncadas todas ellas en una cultura básica general, pero diferenciadas en el tiempo y el espacio. El análisis de estas culturas nos demuestran su fondo común y tanto las preincaicas como las de la época imperial integran una civilización de gran expansión geográfica que hemos llamado civilización Andina" y agregábamos refiriéndonos a los diaguitas que "su estudio debe ser encarado con el mismo criterio de independencia y unidad con que son estudiadas las llamadas culturas preincaicas del Perú" (p. 19) y esto es precisamente lo que hace Bennett y sus colaboradores.

Para una mejor distribución del trabajo el Noroeste fué dividido en cuatro secciones. Cada una de ellas es caracterizada por sus rasgos fisiográficos y estudiados los estilos, sitios e interrelaciones locales para presentar luego un ensayo parcial de culturas y períodos.

Sommer se occupa del Centro, Beiler del Este, mientras que Bennett toma el Norte y el Sur y el delicado capítulo

[4] Julian H. Steward, "American Culture History in the Light of South America," *Southwestern Journal of Anthropology*, Vol. 3, No. 2, pp. 85-107, Albuquerque, 1947

[5] S. K. Lothrop, "South America as seen from Middle America," *The Maya and their Neighbors*, pp. 417-29, New York, 1940.

final de las interrelaciones, períodos, y secuencias de toda la región.

El trabajo se basa casi exclusivamente en el estudio de la cerámica, la que es agrupada, dentro de cada sección, en llamados estilos, designados binomialmente con el nombre de una localidad tipo y una característica generalmente del color. Sobre esta base cerámica y los elementos culturales que le son concurrentes los autores fundan sus culturas, las que en general mantienen la nomenclatura corriente en la Argentina. Los autores dicen que los estilos han sido caracterizados por la concurrencia de color, forma, y dibjuo (p. 21).

Es de lamentar que los autores se alejen, en algunos casos, demasiadamente, de las designaciones clásicas y ya consagradas, sin ningún provecho práctico y con el único posible resultado de introducir confusiones. No vemos por ejemplo fin práctico alguno en sustituir "barreal pintado o polícromo" por "Ciénaga polícromo" y "barreal grabado" por "Huiliche Monocromo." Al contrario en este último case puede llevar a confusiones lamentables. Huiliche (en la grafía actual) no es voz del territorio estudiado y ella designa a tribus de habla Araucana del sur de Chile, precisamente poseedoras de una cerámica pintada que difiere de la de los Araucanos históricos.

En muchos casos los autores designan como "estilos" a simples tipos cerámicos que evidentemente integran verdaderos estilos. El exelente resultado obtenido por los autores en los cuadros finales hubiera sido el mismo llamando más correctamente tipos o formas a lo que ellos con tanta amplitud llaman estilos (el caso de algunos tipos de urnas Santamarianas, el "Paya Policromo" que en realidad son formas de estilo Santamariano).

En la sección Norte reconocen los autores los siguientes estilos: Polícromo Alfarcito, Polícromo de la Isla, Negro sobre Rojo de Hornillos, Negro sobre Rojo de Tilcara, Inciso de Angosto Chico, Variante del Poma Negro sobre Rojo, Polícromo del Cuzco, y Polícromo de la Casa Morada, que como bien lo dicen los autores es una variante local del Cuzco (el Inca-Paya de nuestros trabajos). Además reconoce dos "complejos" el de la Puna y el de Iruya. Para los autores estos "complejos" tienen elementos no cerámicos insuficientemente completos para ser llamados culturas ni suficientemente aislados y cronologicamente ubicados para ser llamados períodos (p. 26).

Previa una discusión de las interrelaciones y dispersión de estos estilos y complejos el autor los ordena en "culturas" y períodos. En la división cuádruple de los períodos (Early, Middle, Late, e Inca) considera el primitivo como carente de vestigios; en el Tardío coloca la cultura de Humahuaca mientras que en el Medio ubica al Polícromo de la Isla y al Polícromo de Alfarcito.

En la sección Central reconocen los autores los siguientes "estilos": Urna Candelaria, Vasos Negros de la Candelaria, Vasos Color Ladrillo de la Candelaria, Urna Santa María, Urna Amaicha, Urna San José, Urna Paya, Urna Negra, Polícromo de La Paya, Rojo sobre Blanco de Yocavil, Polícromo Yocavil, Cuzco Polícromo, Polícromo de la Casa Morada, Negro Sobre Rojo de Poma y Caspinchango. No obstante que los autores reconocen (p. 52) que las urnas Santa María varían de un sitio a otro como desarrollos locales, prefieren llamarlos estilos en vez de tipos, como lo hacemos en la Argentina con más justeza. El estilo Polícromo de La Paya (p. 57) nos parece mal fundado y mal designado.

En nuestro trabajo inédito sobre la cerámica Diaguita al estilo Polícromo de La Paya de estos autores le corresponden el que llamamos "valle arriba" y el Calchaquí o Santamariano con sus variantes locales. Decimos en ese trabajo inédito "Desde Cafayate más o menos, valle arriba, se desarrolla un estilo decorativo que no es modalidad santamariana aunque aparentemente lo parezca porque estamos acostumbrados a ver en este los elementos de aquel estilo, al que llamaremos 'valle arriba.' Los elementos primarios de este estilo son: la estilización de un ave de perfil de alas abiertas que recuerda en mucho al ave de perfil de Santiago del Estero; la representación de un animal de cola enroscada que en el estilo Inca Paya [el Polícromo de Casa Morada de los autores comentados] se transforma en el característico monstruo tan común en él; la representación de la serpiente de cuerpo formado de óvalos, la representacion de un ave bicéfala de frente etc."

La sistematizacion e interrelaciones del material estudiado por los autores los llevan a admitir las siguientes culturas: Candelaria, Calchaquí, Transicional, e Inca, que en el desarrollo cronológico cúadruple corresponden al Primitivo, Medio, Tardío, e Inca. La Transicional sería para los autores una cultura mezclada que retiene elementos Calchaquí y agrega otros que se acercan al complejo Puna. En realidad la cultura Transicional de los autores comentados no es otra cosa que el efecto y predominio en parte, de la cultura Atacameña sobre la Santamariana del valle Calchaquí y solamente en un sector de él.

Los autores piensan que la presencia de alfarerías Polícroma de la Ciénaga y Huiliche Monocromo en el valle de Yocavil y Calchaquí, se debe a que la cultura de los barreales llenó allí el "período primitivo." No debemos olvidar que cuando los españoles entraron al valle encontraron muchas tolderías asentadas allí, de indios "advenedizos de Londres" que mantenían en jaque a sus auténticos moradores o sean los calchaquíes. Y Londres estaba en la zona céntrica de la cultura de los barreales. Nosotros consideramos a Barreales como una de las culturas más antiguas pero esto no quiere décir que no haya persistido hasta época reciente. En Cordon Monton cerca de Animaná, se ha constatado la coexistencia de barreal pintado (Ciénaga Polícroma) con el mas puro estilo Inca. En este capítulo dedicado al sector Central Bennett realiza un análisis de la tumbas de la Paya (p. 71) de magistral realización.

En el sector Sur se reconocen los estilos Huiliche Monocromo, Ciénga Polícromo, Condorhuasi Polícromo, Jachal Negro sobre Rojo o Angualasto, Urnas Belen, y Cuzco Polícromo. Reconoce la posibilidad de un nuevo estilo en San Juan sobre la base de las vasijas incisas estudiadas por Debenedetti en Calingasta y algunos estilos mezclados. Como los autores no consideran en su trabajo mas que el material bibliográfico no hay que inculparlos de lagunas en estilos y tipos que por otra parte ellos honestamente declaran.

Admiten en este sector cuatro culturas distintas: Aimo-

CUADRO 18. SÍNTESIS DE SEQUENCIAS EN EL NOROESTE ARGENTINO

Periods	*The North*		*The Center*		*The South*	*The East*
Colonial		Colonial		Caspinchango Crudeware	Colonial	
Inca	Inca	Complexes: Casa Morada Polychrome; Cuzco Polychrome; Tilcara Black-on-Red; Poma Black-on-Red	Inca	Casa Morada Polychrome; Cuzco Polychrome; Tilcara Black-on-Red; Poma Black-on-Red	Cuzco Polychrome; Local Black-on-Red; Plain Urn	Inca Derived
Late	Humahuaca	Puna-Iruya: Hornillos Black-on-Red; Angosto Chico Incised; Isla	Transitional	Black Urn: Hornillos Black-on-Red; La Paya Polychrome	Aimogasta: Jachal Urn; Jachal Black-on-Red	Epiaverías Polychrome; Represas Polychrome; Llajto Mauca Bicolor B
Middle	Middle	Polychrome; Alfarcito Polychrome	Calchaquí	La Paya Urn; San José Urn; Amaicha Urn; La Paya Polychrome; Santa María Urn; Yocavil Polychrome; Yocavil R-on-W	Belén: San José Urn; Hualfín Polychrome; Belén Urn; Condorhuasi Polychrome; Calingasta Polychrome	Marías Polychrome; Averías Polychrome; Llajta Mauca Bicolor A
Early			Candelaria	Candelaria Brickware; Candelaria Urn; Candelaria Blackware	Barreales: Ciénega Polychrome; Plain Urn; Huiliche Monochrome	Crude Urn; Bislin Incised

gasta (o sea la Angualasto o Sanagasta de los autores Argentinos), la cultura Belen, la cultura de los Barreales, y la más reciente Inca. Para los autores Condorhuasi no encaja en ninguna de las anteriores culturas pero no tiene suficientes evidencias para considerarla como cultura aparte. Lo mismo sería el Calingasta Inciso aunque bien podría ser una manifestación local de la cultura de los Barreales (p. 118).

Estas culturas cubren las provincias de Catamarca, La Rioja, y San Juan y dice Bennett que "desde que las distribuciones no son mutuamente exclusivas cada una de las culturas principales representan probablemente un período distinto de tiempo" (p. 118). Coloca así a Barreales en los albores y a la cultura Aimogasta muy próxima a los Incas.

Este criterio de Bennett no parece responder a la realidad. Cada cultura se desarrolla independientemente y se expande interfiriéndose y compenetrándose con otras vecinas. Los diagramas de disposición horizontal no podrán explicar nunca el fenómeno cultural de nuestro Noroeste y habrá que idear diagramas de curvas ascendentes.

El sector Este, o sea Santiago del Estero y zonas limítrofes, es estudiado por Bleiler. Resume los hallazgos anteriores a los trabajos de los hermanos Wagner y luego los de estos autores. La fuente de información principal es el trabajo de los Wagner. A falta de informaciones estratigráficas recurre sólo a la clasificación tipológica de la cerámica.

Consideramos poco menos que imposible tentar en base de la bibliografía hasta aquí publicada una ordenación

cronológica y aun esto reza para la ordenación tipológica. De ahí que el autor es poco feliz en su tentativa.

El Bislin Inciso está bien fundado no así las Urnas Crudas que debe ser desdoblado en varios tipos de cronología distinta. Las urnas de asas planas no tienen nada que ver con la de superficie áspera y apéndices cónicos. No es exacto lo que afirma en p. 126 de que estas urnas (tomadas en conjunto) son casi idénticas a las encontradas en Pampa Grande y Candelaria, aunque algunas pocas se vinculan evidentemente. Admite además un estilo Llajta Mauca Bicolor, un estilo Averías Polícromo, un Polícromo Marías, y un Represa Polícromo.

A Bleiler le ha tocado el más difícil y complejo de los sectores y no obstante la pericia con que encara su trabajo no ha podido sortear las enormes lagunas y dificultades con que aquí mismo hubiéramos tropezado.

Bennett nos presenta el cuadro final de correlaciones y períodos. Como la información arqueológica no es suficientemente completa para cada sección, trabajos futuros "provocará indudablemente algunas modificaciones radicales en la presente interpretación" dice Bennett.

La ordenación propuesta por los autores puede ser observada en el Cuado 18 (p. 142), que es una síntesis de los cuadros que acompaña el análisis, discriminación, y ordenación de cada una de las cuatro secciones.

Para el período primitivo ensaya una caracterización general. Observamos nosotros que la cultura de los Barreales no llena sólo el período primitivo. Se origina en él y en el sector sur, pero persiste y se expande. En el este de Catamarca en Cortaderas aparece junto con Averías Polícromo ("Middle" de los autores) y en el valle Calchaquí, proximidades de Animaná, aparecen piezas barreales mezcladas con Inca. Piezas Candelaria aparecen, aunque sin conexión definida, en el valle Calchaquí y al oeste de este valle en el del Cajón. Nosotros nos inclinamos a pensar en la existencia de una cultura básica bastante extendida que ubicaríamos en la base del período Early de estos autores, un verdadero pre-primitivo. A su cerámica la hemos llamado "cerámica básica" y la hemos caracterizado así: "generalmente gris o negra o del rojo natural de la pasta cocida, tosca o finamente pulida o lustrada, según las regiones. Es lisa o con guardas geométricas a veces con relieves zoomorfos o francamente antropomorfas y zoomorfas (vasos patos).

"Como conjunto y con sus caracteres arcaicos esta cerámica se mantiene en la cultura de la Candelaria, a lo largo del valle del Cajón y regiones occidentales a él, en la cuenca del Río Loa, en la cerámica de los Atacameños indígenas, de los antiguos y modernos Araucanos y en la arqueología del antiguo territorio Comechingón aunque con menos número de formas.

"En forma más o menos esporádica y quizás como testigo de un anterior periodo cultural esta cerámica se mantiene a lo largo del valle Calchaquí sin influenciar los estilos locales posteriores. En la cultura de los Barreales encontramos muchas de sus formas y no deja de ser probable que su cerámica gris grabada (Huiliche Monocromo) sea una evolución de aquella sobre la cual influye el aporte del estilo felínico que la caracteriza en parte."[1]

No queremos ser demasiado extensos en esta reseaña bibliográfica. Los propios autores declaran que su cuadro será evidentemente rectificado con nuevas investigaciones en el terreno y así lo creemos nosotros. La revisión de material inédito, que no pudieron aprovechar los autores ya dan bases para algunas rectificaciones parciales.

El trabajo satisface, más que por las conclusiones que seguramente serán resistidas aquí en la Argentina, por el método y pulcritud de su realización. Es deseable que el trabajo que comentamos sirva de modelo a arqueólogos argentinos en futuras tentativas. En estas futuras tentativas habrá que considerar mayor número de tipos y formas cerámicas y no olvidar los estados de origen, desarrollo, y decadencia de los estilos a los cuales los autores parecen dar poca importancia.

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[1] Trabajo inédito del autor.

NOTES AND NEWS

SOUTHWEST

The results of the University of Arizona Archaeological Field School Studies at Point of Pines during the 1948 season may be summed up as follows:

1. Demonstrating the existence of rectangular platform-type kivas among the southern Anasazi. Four such structures were excavated, all dating from the fourteenth century. The location of these kivas apart from the pueblos may be one reason why they have not been found heretofore.

2. The discovery that domestic water was obtained at least as early as the twelfth century by the excavation of large walk-in wells, strategically located in valley floors, to tap a relatively shallow water table. The maximum depth in one of two wells explored was 4.5 m. Large reservoirs were also constructed to impound surface run-off to provide a temporary source of water.

3. Extensive use by the Pueblo Indians of cremation coexistent with inhumation during the twelfth, thirteenth, and fourteenth centuries.

4. Further definition of the developmental phases between 1100 and 1400 A.D.

5. A large D-shaped pithouse in a plainware-redware site was excavated as a demonstration of the architectural form used by the early Mogollon inhabitants of the area.

The students in attendance during the eight-week field course represented the following institutions: Harvard, Radcliffe, Yale, Princeton, Michigan, Washington, Aurora, and Arizona. The Hungarian National Museum was represented by Dr. Stephen Borhegyi, who holds a Viking Fund Post-Doctoral Fellowship.

The name of the Colorado Museum of Natural History has been changed to the Denver Museum of Natural History. The Museum is owned and maintained by the City of Denver, and it seemed desirable to avoid confusion with state institutions. The "Popular Series" of publications of the Museum will be continued in the same sequence, with the same numbers, the name "Denver" merely replacing "Colorado" in future papers or in revised editions. The *Proceedings* will be discontinued, Volume XVIII, No. 2, being the last number issued. A "Technical Series," numbered consecutively, will replace the *Proceedings*.

With the aid of students from the Department of Anthropology of the University of Denver, Marie Wormington and others last spring undertook salvage activities in the reservoir and constructions areas of the Cherry Creek Reservoir project in Arapahoe County, Colorado. In August, a small party was in the field completing the excavation of the Turner site near Cisco, Utah. It is hoped that a report on the five seasons of excavation at this site may be published in the spring. One *Proceeding*, entitled "A Proposed Revision of Yuma Point Terminology," was published this summer. At present Miss Wormington is working on a third, completely revised edition of "Ancient Man in North America." The second edition is out of print.

During the summer Arnold Withers and others from the Department of Anthropology of the University of Denver cooperated with the Smithsonian Institution in the River Basin Surveys program. Eight proposed reservoir sites were surveyed for the Blue River-South Platte project. These sites are all high in the mountains. A number of temporary camps were found, presumably Ute.

Six proposed reservoir sites were surveyed in the vicinity of Pueblo, Colorado for the Gunnison-Arkansas project. Many camp sites with stone circles and some cave sites were found. Much more work will have to be done in this area before the cultural affiliation of the sites may be known. Future work along the same general plan will continue, with plans for the excavation of key sites.

Directed by Robert Lister, the University of Colorado held a field course in Anthropology in Yampa Canyon, northwestern Colorado, during the summer. The work was sponsored jointly by the Department of Anthropology, University of Colorado, and the University Museum. Five weeks were spent in excavation and reconnaissance. The result substantiated the existence of Fremont type culture in that area, and revealed an earlier pre-pottery culture horizon in a deep refuse midden. Also during the summer, Robert F. Burgh cooperated with the Smithsonian in relation to River Basin work.

Following the death of Dr. Sylvanus G. Morley in Santa Fe, on September 2,[1] the Directorship of the combined Laboratory of Anthropology, Museum of New Mexico, and School of American Research was filled by the appointment of the Hon. Boaz Long, who was already serving as president of the Laboratory Board and a member of the Managing Board of the Museum and School. After spending his youth in Las Vegas, New Mexico, Mr. Long's various appointments have included: Chief, Latin-American Division of the Department of State; American Minister to El Salvador; American Minister to Cuba; department administrator to Puerto Rico under the N.R.A. In 1936, he was appointed American Minister to Nicaragua; two years later he was transferred to Ecuador, where he remained until 1943. Until 1945, with his retirement, he served as Minister to Guatemala.

Other information from the combined Santa Fe institutions includes the following: The report on the mission excavations of San Gregorio de Abo, by J. H. Toulouse, Jr., is now being printed by the University of New Mexico Press. Bertha Dutton plans the classification of the material which she excavated at Abo in 1944. Stanley Stubbs' work on his report dealing with the pueblos as they appear today is almost completed. His study is based on aerial photographs and will include accurate ground plan layouts of each village. For the second season, the museum cooperated with the National Girl Scouts organization in a practical field trip for senior scouts, directed by Bertha Dutton.

Edwin N. Ferdon, Jr., has been granted $1,500.00 by the Viking Fund to finish an archaeological survey of Tonala, on the west coast of Chiapas, Mexico. Ferdon plans

[1] See above pp. 215–221. *Editor.*

two months in the field, beginning the middle of October.

Dr. Charles E. Dibble, of the University of Utah, and A. J. O. Anderson, of the Museum of New Mexico, have begun translation of the Nahuatl text of the Florentine Codex, in Santa Fe.

Several research workers took advantage of the facilities of the Laboratory of Anthropology during the summer. Dr. and Mrs. Fred Eggan, of the University of Chicago, continued earlier projects; Dr. Helmut de Terra, Viking Fund scientist, prepared slides on archaeological subjects; Clara Lee Tanner, of the University of Arizona, investigated historical development of Southwestern Indian painting.

The Museum of Northern Arizona sponsored a summer field expedition of twelve weeks duration during the summer. Dr. Harold S. Colton was in general charge, and Watson Smith, of the Peabody Museum of Harvard University, served as field director. He was assisted by Dick Shutler, Jr., University of California; George Ennis, University of Pennsylvania; Eugene Frosio, University of New Mexico; Milton A. Wetherill, Lupton, Arizona; three Hopi men and one Navaho. The expedition was in the field six weeks while excavating four small pueblos, three kivas, and two pithouses on the western portion of the Wupatki National Monument, some 30 miles northeast of Flagstaff.

The second six weeks was spent at the laboratory of the Museum, where the field workers were assisted in working over the material from the excavation by Katharine Bartlett, Curator of Anthropology, and Virginia Pullen, Assistant. The sites excavated date in the first half of the twelfth century, A.D. A preliminary report by Mr. Smith will be published within the next few months.

Together with Dr. and Mrs. Colton and Miss Bartlett, members of the field party attended the Southwestern Archaeological Conference at Point of Pines. Future plans of the Museum of Northern Arizona include excavation of a number of small early sites in the middle Verde Valley.

The Anthropology Field Sessions of the University of New Mexico participated or cooperated in several projects relating to both archaeology and ethnology, under the general direction of Paul Reiter. The archaeological projects included the following:

1. A mounded early Pueblo IV village site, located in Tijeras Canyon 14 miles east of Albuquerque, was partially excavated. The site consists of one large group of rooms and several small groups. The excavation was undertaken by beginning students under the supervision of Stanley Stubbs, of the Laboratory of Anthropology, who served as visiting Professor of Anthropology at the university during this summer as well as the preceding one. A somewhat sensational find was that of the skeleton of an adult mother, with a partially expelled foetus in breech presentation.

2. Two miles farther east, a small site of late Pueblo III and early Pueblo IV was virtually completely excavated. This contained five rooms which partially overlaid two pithouses. Stone masonry with stone flagstone flooring, the presence of Galisteo Black on White, and the absence of Rio Grande Glaze were the salient points encountered. This site fits into the relatively poorly known interval at the very end of Pueblo III in the Rio Grande. The project was in charge of Fred Wendorf, Visiting Professor of Anthropology at the University of New Mexico.

3. Edward Dittert continued excavation in the Cebolleta Mesa area south of Grants, and in the same general area Reynold J. Ruppe, Jr. undertook a quantitative archaeological survey of several sections of land on the ranch of Arthur Bibo, whose cooperation made possible the continuance of this project for another season. The work of these two advanced students disclosed a small series of partially subterranean jacal-like structures, large surface pueblos with standing walls of a Chaco-like masonry, and kivas which, after excavation, bear more than a superficial Kiatuthlanna-like appearance. The survey also disclosed a large great kiva with four symmetrically placed antechambers.

4. The Anthropology Field Sessions cooperated with the Early Man project of the Peabody Museum of Harvard University by furnishing a camping outfit, some transportation, and a group of students to assist Mr. and Mrs. Herbert Dick, Jr., at the Bat Cave excavation in Catron County. These students included Eloise Richards, Charles R. McGimsey, Mr. and Mrs. Hugo Cotter, Ethel Nurge, Nancy Williams, Louis O'Grady, Dorothy Menzel, Francis Cassidy, and Michael Harner. Harvard students and assistants included Peter Goethals, William Morrison, Robert Spier, and Mr. and Mrs. Earl Smith.

5. A small quantity of archaeological excavation and reconnaissance in east central Utah, north of Whiterocks, was undertaken by James Garner, under the direction of Dr. Florence Hawley.

In addition, several individual students were associated with other projects, Boyd Wettlaufer spent the summer in Santa Fe as an assistant to Dr. Walter Taylor. The interval was devoted to making a detailed analysis of the sandals from Dr. Taylor's fieldwork in western Coahuila. Thomas Bahti spent a part of the summer in the Largo-Gallina area in connection with Dr. Hibben's work at Rattlesnake Point. Jerome Swenson was associated with the Harvard-Ohio State project concerning the physical anthropology of the Ramah Navajo. Also, four graduate students were in the field doing preliminary work on M.A. and Ph.D. theses, chiefly in ethnology.

Dr. Eric Reed has furnished a series of notes relative to the activities of National Park Service, Region Three, personnel. In connection with the stabilization work in Chaco Canyon National Monument, Gordon Vivian and Raymond Rixey have discovered a large number of artifacts of painted wood which came from one of the north rooms in the central sector of Chetro Ketl. These consist of various animals, a miniature and quite clumsy bow and arrow, and several brightly colored specimens which may be remains of *tablitas*. Dr. Gordon Baldwin has completed laboratory work and his report on the Patayan sites which he excavated last fall in the Davis Dam Reservoir area on the lower Colorado River. Baldwin transferred to Omaha, Nebraska, in August, replacing Jesse Jennings there.

Al Schroeder has been testing a Sinagua ball-court east of Montezuma Well, in central Arizona. He has also written up a general study of Arizona ball-courts. Dale King's report on the excavation of Nalakihu, in Wupatki National

Monument, Arizona, and a paper by Charlie Steen on the Nagas, based on his contacts and observations in Burma, have been accepted for publication.

Archaeological projects undertaken under Department of Interior permit included the following:

1. The field school of Adams State College of Alamosa, Colorado, was located at Bandelier National Monument west of Santa Fe. Under the direction of Fred Worman, a site listed in the Laboratory of Anthropology survey as LA 217 was tested, as well as sites on the land north of the monument. LA 217 is an early Pueblo IV glaze site.

2. David de Harport, graduate student at Harvard, began an intensive survey of the Canyon de Chelly National Monument, and located 140 sites in the lower part of Canyon de Chelly.

For its first post-war field season, students of Texas Technological Institute returned to Arrowhead Ruin near Glorieta, New Mexico. Dr. Holden's long-term project was in charge of W. M. Pearce this year.

The Gila Pueblo project at Mesa Verde National Park was completed at the end of the second field season, under the direction of Dr. Deric O'Bryan. The last summer's work extended from June until early September. Two sites were excavated, a Basketmaker III area containing two pit-houses and a Pueblo III surface compound. A second current Gila Pueblo project took place last spring, when two months were spent in the Tularosa drainage south of Quemado, New Mexico. Following up work of the previous year, about half of the early Pueblo III site at this location was cleared. In between field projects Gila Pueblo has continued the usual tree-ring dating for several sister institutions, and augmented the never-ending ruin survey. At present the staff at Gila Pueblo consists of Dr. Derick O'Bryan, John MacSporran, who is assisting on the Tularosa project, and Ruth Agawa, who is handling much of the tree-ring and laboratory work.

During the 1948 field season the Southwest Archaeological Expedition of the Chicago Natural History Museum, under the leadership of Dr. Paul S. Martin, with the assistance of Dr. John B. Rinaldo, continued investigation of the sequence of Cochise and Mogollon cultures as represented in the Pine Lawn Valley of west central New Mexico. Among the interesting discoveries was an additional concentration of Cochise-type grinding tools and hearths on the Wet Leggett arroyo about two miles down stream from the major concentrations of artifacts discovered in 1947. Dr. Ernst Antevs, who made this most recent discovery, has tentatively dated this concentration as being of the same age (about 4000 B.C.) as those discovered last year.

Following up work initiated during the 1947 field season, the expedition also excavated fourteen additional pit houses on the Turkey Foot Ridge site, with the aim of locating pit houses of the Georgetown and San Francisco phases to fill in the gap in the local sequence between the Pine Lawn Phase and the Three Circle Phase. Four of the houses excavated during the present season have been tentatively classified as belonging to the San Francisco Phase and one to the Georgetown Phase, thus filling this local gap. Charcoal was obtained from all but two of the total of sixteen houses excavated on the site and it is expected that dates will be forthcoming. A number of features were discovered which have not previously been reported for houses of these phases in other localities, such as the presence of cupboard recesses in the walls of the San Francisco Phase houses, and a bench along the walls of the Georgetown house.

Two of the houses possessed particularly interesting features. One had been transformed into an Anasazi type kiva from a typical Mogollon pit house of the San Francisco phase by the installation of a masonry ventilator tunnel and shaft in the stepped lateral entrance. The recesses for main roof support posts in the side walls were filled with rock, and masonry was added to the south and east walls to hold back rubbish. The roof type was changed from a ridge-pole type to a four-corner-post type. Finally, a deflector was placed in front of the ventilator and the former central roof support post-hole plastered over.

Another much larger house had the distinctive feature of a rectangular area in the center of the floor outlined by logs placed in grooves in the floor. This area contained the fire pit, the central roof support post, and two small post holes placed about two feet apart, which are presumed to be ladder holes. It is expected that these two houses will form important links in tracing the transition from pit house to kiva in this area. (*P. R.*)

PLAINS

According to information from Alex Krieger at the University of Texas, T. N. Campbell has continued manuscript work on Texas coastal archaeology. With assistance from the Texas Memorial Museum, he excavated a shell midden on the shores of San Antonio Bay.

In July and August, J. Charles Kelley made a reconnaissance of the Rio Grande Valley between El Paso and Presidio. In June, and again in August, Herbert C. Taylor, Jr., advanced student, conducted a reconnaissance at his own expense in the Rio Grande-Pecos River confluence area. Seven new sites of the Pecos River Focus were located, four of them containing pictographs. In June Taylor trenched a cave on the Zuberbueler Ranch in Val Verde County, and a burnt-rock midden near Langtry, Texas.

The Battle Mound on the Red River in Lafayette County, Arkansas, was explored with funds provided by the Viking Fund, Inc. While under the supervision of Alex D. Krieger of the University of Texas, the actual field work was conducted from June 25 to September 12 by Lynn E. Howard of the University of Michigan. (M. P. Miroir of Texarkana was unable to undertake this work, as had been announced earlier in AMERICAN ANTIQUITY.) Howard, Krieger, and Glen L. Evans, Asst. Director of the Texas Memorial Museum, cleared the mound of brush and made an accurate contour map before excavation began. A study was made of alluviation of the Red River valley floor around the mound, and it was determined that considerable filling has taken place since the mound was erected, a condition found at several important mound sites about the Red River bend. The outlines of two houses were found on platforms below the main rise of the mound. A great quantity

of potsherds was found at different levels, but almost no other artifacts. Interestingly, the pottery indicates that most of the mound, if not all, was erected by peoples akin to those of the Belcher Focus in northwestern Louisiana; it was a surprise to find that mound-building was practiced at such a relatively late time by people undoubtedly of the Caddoan family.

The salvage of archaeological remains by the River Basin Survey continued during the summer, Robert L. Stephenson conducting surveys in the San Angelo area, and later in the Lavon and Grapevine reservoir basins in the Fort Worth-Dallas area. Much valuable assistance was given in the latter reservoir basins by the Dallas Archaeological Society.

The Texas Memorial Museum did field work in the late Pleistocene fossil localities in the Texas Panhandle, and in August began work in an important stratified site at Lubbock; this promises to yield new data on the sequence of extinction of several species elsewhere found with artifacts.

In September, a cave 65 miles west of San Antonio was reported to the University of Texas by Mr. George C. Martin of San Antonio, and arrangements were made with the Texas Memorial Museum for excavation. The cave was found by Mr. Eugene Mear of San Antonio, who screened three true or classic Folsom Fluted points from the back dirt. Archaeologists will be greatly indebted to Mr. Mear for his quick recognition of the site's importance, his reporting it to Mr. Martin, and his presence of mind in preventing further disturbance.

Dr. J. Charles Kelley and Mr. Donald J. Lehmer, in Austin, have resumed study of the material derived from their excavations of 1939 at La Junta de los Rios, in the Presidio region. The original field project was cooperative one between the School of American Research and the Sul Ross College of Alpine, Texas.

The University of Oklahoma conducted its first field session in archaeology during the summer. Seven students participated for a period of eight weeks under the direction of Dr. R. E. Bell. The first four weeks saw excavations resumed at the Scott site near Wister, Oklahoma. One component of the Fourche Maline complex, an early archaeological horizon in eastern Oklahoma, was represented. This complex includes both a pottery and a prepottery stratum and should probably be divided into two periods. Several burials and numerous artifacts were found.

During the last four weeks explorations were made at the Norman site, near Wagoner, Oklahoma. These were at first limited to the village area and later were directed toward a large conical mound. Within the village area portions of several superimposed houses, as well as some circular pits, were exposed. A trench was extended along the northern edge of the mound to establish its base and its northern limits.

About August 15th excavations were resumed under a joint project between the Smithsonian Institution and the University. The Smithsonian sent Mr. Joe Caldwell to aid in supervision of excavations, which continued until September 22, 1948. The large, conical mound involved was a domiciliary sub-structure which included six construction periods. The final occupation surface was capped by a cone-shaped mound, thus modifying the flat top usually associated with this type of mound. Glass trade beads were found in the conical capping. The outline of the superimposed mound is circular rather than square or rectangular as in many substructure mounds. The subsequent periods of construction were done in a manner which merely heightened the mound and did not enlarge its circumference. The mound is one of a group which belongs to the Spiro Focus of the Gibson Aspect.

Dr. Karl Schmitt has completed a preliminary statement upon the Lee-Bowen site which was tested last spring. This site is located on the Wichita River in Garvin County, central Oklahoma. Schmitt's report will appear in the University of Oklahoma Museum Information Series, and free copies will be available upon request.

George McClure has brought to our attention a newly discovered site in Grady County, Oklahoma. The Department plans some excavations here this fall. Surface materials suggest that it may be related to Krieger's Henrietta Focus of northern Texas.

Mr. David J. Wenner, under the Smithsonian, conducted a survey and testing program within the Tenkiller, Eufala, and Onapa Reservoir areas. One hundred new sites were recorded.

David Baerreis, of the University of Wisconsin, spent the summer in Norman re-examining and analyzing materials excavated in the northeastern part of the state. He has been preparing material for publication on the pre-pottery and Hopewell horizons in Delaware County, Oklahoma.

The University of Oklahoma Museum has been allotted new quarters and is in process of consolidating exhibits. The Mississippi Valley Dendrochronology Laboratory has been moved from the University of Chicago to Norman, and should be in operation once again this fall. Archaeologists working within the Mississippi area are invited to submit specimens for examination.

The field parties of the University of Nebraska State Museum continued to collect in the Medicine Creek and Harlan County reservoir areas in the Republic River drainage in southwestern Nebraska. The first part of the collecting season on Medicine Creek was spent excavating at the upper Pliocene quarries. These sites are producing a fauna which is almost new to the Great Plains. A preliminary study of the fauna indicates that it represents the very latest Pliocene so far found in the Plains region. It is fortunate that this important material could be salvaged, since it will be of much value in solving the Pliocene-Pleistocene boundary line problem, which indirectly will aid in a better understanding of the Pleistocene as a whole. The field work on the Republican was under the direction of W. D. Frankforter and C. Bertrand Schultz. Loren Toohey was Senior Field Man at the Medicine Creek localities and Allen Graffham in the Harlan County areas.

On Medicine Creek, just below the mouth of Lime Creek, a bone deposit in the base of Republican River Terrace No. 2 (a 55 foot terrace) was excavated during the latter part of the summer (July 15 to September 1). This site, Ft-50, was discovered in 1947 and was considered as one of the Lime Creek sites. Since the bones were associated with artifacts an archaeologist, Dr. Preston Holder, was employed

to supervise the archaeological portion of the excavations.[2] Dr. Gilbert C. Lueninghoener, Professor of Geology at Midland College, aided Frankforter and Schultz in the study of the Pleistocene terraces of the Republican Valley during the summer. An archaeological report as well as papers concerning the geological and paleontological problems at Ft-50 are in the process of preparation.

The University of Nebraska State Museum has had several new staff members added during the past year. Newly appointed curators include: E. Mott Davis (from Harvard University) in Anthropology; Dr. J. F. Davidson (University of California) in Botany and the Herbarium; Dr. Martin Muma (University of Maryland) in Entomology; T. B. Thorson (University of Washington) in Zoology. Allen Graffham (from the University of Kansas) has been appointed Assistant Curator in Geology.

Thompson M. Stout of the Department of Geology and Museum staffs has just returned from a two and one-half month study of paleontological specimens in various museums in France, Switzerland, England, and Holland. He also attended the International Zoological Congress in Paris and the International Geological Congress in London.

Field investigations stemming from scientific salvage operations in the Missouri River Basin began on March 29, 1948 with a large scale archaeological excavation program at Medicine Creek reservoir in southwestern Nebraska. Through an agreement with the Bureau of Reclamation, power machinery and labor were supplied by that agency while the Lincoln office of the River Basin Surveys provided professional supervision. Under this arrangement, sites on and near the dam axis, in the borrow area, and in the nearby future pool were systematically and comprehensively excavated. For the most part, the remains represented the prehistoric Upper Republican horizon, of which six village sites were largely or wholly cleared. From the 28 house sites opened, much new information was obtained on village pattern and size, on house construction, and on various other matters. In addition, a very extensive series of pottery, stone, bone, and other artifacts, vegetal food remains, animal bone refuse, etc., was accumulated. Large and well-preserved house timbers may prove useful in future dendrochronological studies. An earlier Woodland occupation is represented by two small sites, where pits, postmolds, hearths, burials, and a rather scant but apparently diagnostic range of artifacts were worked out. The Medicine Creek work, which terminated late in August, was in charge of M. F. Kivett with George Metcalf as assistant.

A second field unit under Jack T. Hughes began operations at Angostura reservoir near Hot Springs, South Dakota, in June. A few pottery sites were recorded, but these appear to be uncommon and of relatively late age. Much more abundant are non-pottery sites, many of which may well be pre-pottery in time. Limited tests in several suggest very promising leads toward cultural sequence. At least one site was found with projectile points suggesting Plainview and perhaps other relatively early types. These artifacts were weathering out of a stratum containing charcoal and other evidences of a definite camp site level. Animal bones have not been found, perhaps because of the highly gypsiferous character of the soils involved. Further excavations here are called for, as well as more detailed study by geologists and physiographers. The Hughes party also carried on a brief reconnaissance at Edgemont, Keyhole, and other proposed reservoir sites in the Cheyenne River basin, and found additional evidence of pre-pottery complexes. From the nature of the sites and the types of projectile points and other artifacts recovered, it seems likely that some of these materials would go far toward closing a few of the shortening "gaps" between the early lithic sites and the later pottery horizons of the western plains.

A third field unit headed by Paul Cooper spent several weeks in test excavations at Heart Butte reservoir, North Dakota. It was finally concluded that relatively little material of importance to archaeology is likely to be lost by reservoir construction here. At the end of July, this unit moved to the lower Oahe reservoir area to conduct preliminary reconnaissance on the mainstem between Pierre and the mouth of Cheyenne River. This region contains numerous village sites of somewhat varied character, presumably indicating a rather lengthy and intensive occupancy. The great majority will be flooded by the future reservoir pool; with one or two possible exceptions none has been comprehensively studied. At least three sites in and near the construction area will be extensively damaged or else destroyed by the initial phases of construction activity.

Field work by cooperating agencies was carried on during the summer in Kansas, Nebraska, and South Dakota. In Kansas, a State University expedition under Carlyle Smith excavated on a limited scale at Woodland, Upper Republican, and other sites in Kanopolis reservoir, on the Smoky Hill River. Several of these are now under water, but their cultural affiliations have apparently been established. Smith's party also worked several stone cairns and other sites in the vicinity of the reservoir, confirming the presence of a Hopewellian horizon in the district, and trenched several mounds and other features at Great Bend Aspect sites on Little River.

At Medicine Creek, Nebraska, in addition to the work of the River Basin Surveys unit, two state-supported agencies were in action. A field party from the Nebraska State Historical Society, under direction of A. T. Hill, worked several sites lying mainly north of Lime Creek and upstream from the section under study by the River Basin Surveys. Fourteen house sites, several middens, caches, and other features were excavated, all apparently assignable to the Upper Republican horizon, and a large quantity of artifacts was collected. This material will have great comparative value in connection with that obtained by the River Basin Surveys unit, and it rounds out an unusually extensive and complete series of data from a single rather restricted geographical area.

Excavations were also conducted at Medicine Creek by the University of Nebraska State Museum, under supervision of Dr. C. B. Schultz and W. D. Frankforter and the active field leadership of Preston Holder. At a deeply buried site below the mouth of Lime Creek were found hearths, refuse animal bone, chipped stone artifacts, bone

[2] As discussed below, pp. 246–7. *Editor.*

implements, and other materials, all evidently pertaining to an early hunting complex. The age of this material, its relation to a pre-pottery site opened on Lime Creek in 1947, and its position in Plains archaeology remain to be worked out.

At Harlan County Reservoir, in southern Nebraska, a University of Nebraska Laboratory of Anthropology party under Dr. J. L. Champe spent several weeks investigating a Dismal River culture site. Three habitation sites with hearths, a roasting pit, and other features were uncovered, and a rather extensive series of artifacts representative of the horizon were secured. This is the easternmost site of the Dismal River complex yet excavated, and the degree of its similarity to others previously studied will be of interest. In contrast to other related sites in southwestern Nebraska and western Kansas, this one yielded no evidence of Pueblo contacts.

In eastern North Dakota, Dr. Gordon W. Hewes and a combined University of North Dakota-North Dakota Historical Society party spent several weeks investigating burial mounds and village sites in Baldhill reservoir. Inclement weather seriously hamped these activities. In certain respects—sub-mound burial pits, secondary interments, and log grave coverings—the mounds suggest affinities with others opened by the River Basin Surveys near Wheeler Bridge, in Fort Randall reservoir area, South Dakota, in 1947. Appraisal of these seeming similarities and their significance must await fuller statements of findings in both localities.

Owing in large part to shortage of funds, no archaeological field work was attempted by the River Basin Surveys during 1948 in Colorado, Montana, or Wyoming (excepting reconnaissance in the Cheyenne River basin, northeastern Wyoming). A paleontological unit headed by Dr. T. E. White spent several weeks collecting fossils at Boysen reservoir, Wyoming, and also operated for a time at Canyon Ferry, Montana. (*W. R. W.*)

NORTHERN MISSISSIPPI VALLEY

Two mound sites and five village sites in Minnesota were studied during the eleven weeks of summer. In one mound group near Spring Valley, in the southeast, two mounds each had multiple secondary burials at the mound center on the original ground level, with no grave goods. These few traits are characteristic of the Mille Lacs Aspect (Sioux) of the Woodland Pattern, but are found in other Woodland cultures as well. In a mound group near Zimmerman in the east central area, the largest mound was 11 feet high. The top four feet of this mound were removed, disclosing a cumulative mound with one or more secondary burials on each level. Each burial consisted of the bones of from one to six individuals, with grave goods very rare. A feature was a remarkable cache of animal bones at the base of the eastern edge of the mound. With a few exceptions these consisted of the skulls, and especially the mandibles and teeth of the black bear.

At the modern Chippewa Indian village at Nett Lake, in the northeast, was a prehistoric village that, in the quantity of potsherds, was unusually rich for a Minnesota Woodland site. Both Laurel (Rainy River Aspect) and Blackduck (Headwaters Lakes Aspect) sherds were here, the latter apparently predominating. It is not certain that a study of the material, dug by levels, will reveal a significant stratigraphy, because of the activities of the Chippewa, who caused much disturbance by the construction of "jigpots" for the hulling of wild rice in the nineteenth century.

Village sites near Granite Falls and Hanley Falls, in the southwest, were interesting because of the presence of sherds having the trailed line decoration of the Cambria (Mississippi) type, and of others of distinctly Plains types. These sites are along wooded streams and lakes, and the cultural debris is so thin as to suggest temporary camps, as of Plains peoples wintering here where water, wood, and shelter were available.

A rich village site on historically famous Prairie Island in the Mississippi River near Red Wing proved to be of the Oneota Aspect (Upper Mississippi). This is considerably farther north than Oneota sites in Minnesota known heretofore. Strangely enough the pottery seems to resemble that of the Blue Earth Focus, whose center is south of Mankato, more closely than that of the Orr Focus, which centers along the Mississippi near the Minnesota-Iowa line. Though Prairie Island is about equally distant from the Blue Earth and Orr regions, its communication with the latter is much more direct.

The first field research by the Wisconsin Archaeological Survey was conducted this summer from June 15 to August 21. During this period a group of eighteen students from Beloit College, Lawrence College, and the University of Wisconsin participated in the excavation as part of the Beloit College Summer Session. For this first season research was under the primary sponsorship of the Logan Museum of Beloit College. Direction of the field party was by Moreau S. Maxwell of Beloit College and Chandler W. Rowe of Lawrence College.

The site, suggested for investigation by W. C. McKern of the Milwaukee Public Museum, was a group of more than two hundred mounds at Diamond Bluff, Wisconsin, across the Mississippi River from Red Wing, Minnesota. The mound group contained a preponderance of conical mounds —the larger 50 to 60 feet in diameter and 7 to 10 feet high— the smaller 15 feet in diameter and 1 to 2 feet high. Linear mounds were also present and there was at least one effigy mound in a very good state of preservation. From the contour of the mounds, and from the presence in an earlier survey of stamped sherds, it was assumed that the conical mounds at least would prove to belong to the Trempeleau Focus of Hopewell. An adjacent village site obviously belonging to the Orr Focus, Upper Mississippi Phase, on the basis of surface material, was assumed to be later in time.

The evidence from excavation, however, was that the mounds had been built either by an Upper Mississippi people or by a group post-dating Upper Mississippi in the area. No material was found which could be related to the Trempeleau Focus. The large conical mound excavated had apparently been erected as a burial tumulus, although the skeletal material belonging to four adults and one subadult was so fragmentary and so poorly preserved that the orientation of the bodies could not be determined. All of these fragments were well up in the body of the mound

with no indication of a sub-mound pit. Unfortunately there was no cultural material in association with the burials, and any indication of relative chronology must come from the midden material which was used in building the mound. This included an even distribution between cord-roughened, grit-tempered Woodland wares and smooth, shell-tempered Mississippi wares. The shell-tempered sherds belonged to small globular, small-mouthed jars with and without handles and to angular-shouldered bowls similar to those of the Monk's Mound Aspect. A sufficient number of sherds were found of one of these angular-shouldered jars to enable reconstruction. A trailing-incised scroll appears on the section above the angular shoulder and although the tempering material is grit the appearance is that of a Middle rather than Upper Mississippi bowl. Non-ceramic artifacts, although rare, were also of both Woodland and Mississippi character. Testing of the area did not produce any evidence of a Woodland village.

The two small conical mounds excavated were practically barren—one completely so and the other containing two grit-tempered sherds, two shell-tempered, and one piece of worked galena. The small linear mound contained a right humerus in excellent condition in the body of the mound, but no cultural material. A small rectangular sub-mound pit had been dug in the center shortly after mound construction had begun. However, there was no trace here of skeletal or cultural material. The large linear mound excavated, 8 feet high at the center, was also apparently built as a burial tumulus. At least three skeletons in poor condition were found in a flexed position in the body of the mound. Much of the area of this mound was left unexcavated for future seasons. Although the dirt used in mound construction appeared to have come from a refuse area, very little cultural material was found. The few sherds were of Woodland and Mississippi types.

The effigy mound, a long, straight-tailed panther in shape, was partially excavated and, surprisingly, all of the cultural material with the exception of one side-notched projectile point appears to belong to the Orr Focus. Two burials, the first indicated only by a discoloration in the soil and the second by the teeth and a fragment of cranium preserved by a large chunk of charcoal, were found in the body of the mound in the general region of the shoulder and chest. With the first was associated a small loop-handled shell-tempered jar of the type associated with Orr Focus burials and with the second a large globular, trailed-incised, shell-tempered, loop-handled jar. Several sherds of a shell-tempered, angular-shouldered bowl were also found in the back region of the mound, close to the original land surface on which the mound had been built. In the heart region a large oval sub-mound pit had been dug into gravel. On the edge of the pit was a shell-tempered angular-shouldered rim sherd. Within the pit was the flexed skeleton of an elderly female and an infant, with no associated remains. Both of the pit burials and burial number two, a ten to twelve year old, had unusually large teeth, both deciduous and permanent.

Trenching operations were also conducted through sections of the extensive Orr Focus village on the site.

An additional item of archaeological field work done from Logan Museum on behalf of the Wisconsin Archaeological Survey was the excavation of a large burial pit on Lake Monona by Andrew H. Whiteford of Beloit College. During August, while a road was being widened in the vicinity of a large mound which was recently set aside as public property by the Town of Monona, a number of human bones were discovered. At the insistence of interested neighbors the Department of Anthropology at the University of Wisconsin and the Wisconsin Historical Museum sent a group out to examine the find. Preliminary excavation revealed what was interpreted as the remains of a clay mask on the face of the skeleton and, in the belief that the find might be Hopewell, it was decided to suspend operations until a member of the Wisconsin Archaeological Survey could be at the site. Accordingly Whiteford was called and undertook a holding operation to preserve the materials and secure the information in the hope of making it available to the group which will some day conduct further excavations at the site.

No attempt was made to explore the site thoroughly, but in the attempt to delineate the extent of the burial in the road cut, almost two weeks of excavation were carried on, finally resulting in the disclosure of a large rectangular pit (*ca.* 5 ft.×8 ft.×4 ft.) excavated from the surface of the hill and containing twelve burials. The burials were extended in the flesh and secondary bundle burials. Unfortunately no artifacts were found in the pit except one very small copper point. Some suggestion of clay was found about the face of one other skull, but the first specimen on which this feature had been noted was covered with paraffin in the field and has not yet been opened for examination.

Until the materials have been rechecked in the laboratory it is not possible positively to identify the manifestation uncovered here, although the superficial characteristics seem closer to Trempeleau than to anything else known in the area. Robert Nero of the University of Wisconsin assisted in the excavation.

According to Walter Hlady, the Manitoba Museum, with the financial assistants of the *Winnipeg Tribune*, sent out a three man party to conduct an archaeological survey of the Upper Nelson, Echimamish, and Hayes Rivers. Later, a 70-mile stretch of the Nelson River at its mouth was added.

The party was also able to conduct reconnaissances at all ports of call of the lake steamer which took them to the north end of Lake Winnipeg. The whole area is in unsurveyed country except where the rare baseline has been cut through the forests.

Two sites were discovered at the mouth of the Berens River. One is a probable non-ceramic site where the artifacts, mainly end scrapers and blades, are made of a type of chalcedony unknown in the southern section of Manitoba. The second is a ceramic site, which does not appear to date much before the historic period. Pottery is Blackduck Focus, Headwaters Lake Aspect, and both the artifacts and pottery are identical with those found on the Red River of the North.

In the area north of Lake Winnipeg, where the party traveled almost 700 miles by canoe, only ten sites were located. None of these is very large and all except two appear to be historic. In addition, many camping area were

found where material was negligible but charcoal from campfires, sometimes a foot below the surface, was to be found.

On the whole the area was not conducive to human occupation. The country is one of rock, muskeg, and forest with few favorable locations for camping. Game is not sufficiently plentiful to support more than small family groups. Travel is very rugged. The party had to traverse eighty-five sets of major rapids and waterfalls. Any Indian who could have occupied a more favorable area probably did so. Most of the present occupants—Crees—were settled in the area by the Hudson Bay Company as trappers, although some Cree undoubtedly lived in the more favorable areas.

In June and July work was continued in the Whiteshell Forest Reserve. New sites with the same mixture of Blackduck Focus, Headwaters Lake Aspect and Laurel Focus, Rainy River Aspect as at the Rainbow Falls site (C3-UN-1), were found.

The 1948 Kaskaskia Expedition was a cooperative one between the University of Chicago and the Illinois State Museum under the joint direction of John C. McGregor and Kenneth Orr. Other members of the party were Thomas Lee, Charles Leslie, Gordon Keller, Richard McCollough, Molly Allee, Frederick Barth, Florence Simon, all from the University of Chicago, and Richard Trotter from Andover Newton Theological School of Boston. Sallie Robinson of Wellesley College and of Springfield, Illinois, was with the field party for part of the season.

The advance group met with Dr. McGregor at Buffalo Rock State Park on June 17, and prepared the C.C.C. buildings, used last year, for occupancy. Electric lights had been previously installed, roofs and floors repaired, and water supply improved by the State Parks Division. Dr. Kenneth Orr with the rest of the group arrived on the 20th of June.

Four main areas were investigated in Starved Rock State Park, LaSalle County, viz., on top of the Rock and around its base, French Canyon, Lover's Leap, and the old Hotel Plaza. The work was undertaken (1) to determine time and other relationship of the four cultural manifestations or units (communities) discovered last year and (2) to determine the outlines and other details of old St. Louis built by LaSalle and Tonti in 1683. The most important results were:

1. Five new cultural manifestations or influences were discovered, of which the following two are of outstanding interest: (*a*) A very early occupation by a non-pottery using people. (*b*) A Woodland manifestation that probably has never been reported on.

2. Three of the other cultures show distinctive differences, yet indicate three groups whose cultures were fundamentally the same and who occupied the general area at the same time. These possibly indicate tribes of the Illini, who occupied the region immediately around Fort St. Louis in the late 1600's. All three have the same type of European trade goods and there are signs of their "burrowing" native traits or objects from each other.

The details of the structure of the Fort itself were less definite than had been hoped for. A cellar or dugout was found that might have been a French magazine or underground storehouse, and several large postholes 16 to 18 inches in diameter came to light. However, what the purpose of the posts had been was not immediately evident. This may be solved when an intensive study is made of the notes and plans of these features. The Division of State Parks and Memorials has been cooperating with the above mentioned institutions with a view to reconstructing old Fort St. Louis, if practicable.

3. The objects found include glass and porcelain beads of several shapes and colors; brass or German silver finger rings; iron axes, knives, nails; gun parts (including barrels and hammers and flashpans); a copper or brass crucifix; brass kettles, bullets, coins of French, British and U. S. origin; a few iron fish hooks, etc.; as well as chipped flint weapons and tools, others of rough and polished stone, native copper, and fragments of galena and hematite.

Dr. Orr plans to make a survey of private collections and known sites in the area to select sites that appear to contain more information on the new cultural communities found this year. The institutions concerned plan to excavate some of these new sites in 1949. The State Park Division is considering carrying on further exploration on top of the Rock to determine further features of the French Fort.

The Indian Historical Society, Indiana University, and the Indiana Department of Conservation cooperated in sponsoring an archaeological field school at the Angel site during the past season. Eleven students, ten of whom were anthropology majors, participated in the course. The camp, not quite complete at the beginning of the season, will be in readiness by next June for a larger group, who may care to participate in the instructions being given here in proper archaeological method.

As a part of the program being carried out by the Indiana Historical Bureau in those areas of Indiana which may be flooded by the erection of water impounding dams, two counties were surveyed by Vernon Helmen, an anthropology major at Indiana University during the summer.

Since Richard G. Morgan was removed as Curator of Archaeology of the Ohio State Museum by the Board of Trustees for political reasons, the proposed 1948 summer field work in collaboration with Ohio State University did not take place. Work in a mound of the Hopewell culture in Ross County, Ohio was continued by Morgan and Richard S. Baby. Some excellent specimens were recovered as well as additional data on mound construction and the burial complex.

During the summer the Museum of Anthropology of the University of Michigan excavated a protohistoric village site on the west bank of the St. Joseph River near Buchanan, Michigan. The work was under the direction of James B. Griffin and Albert C. Spaulding. The excavation was supervised by Hale G. Smith, University of Michigan, who was assisted by Henry R. Brett, Franklin and Marshall College, and Robert F. Gray, Yale University. Attention was focused on this site because John Birdsell of South Bend, Indiana, had presented a large collection from Moccasin Bluff to the Museum of Anthropology.

Numerous refuse pits, firepits, and stone fireplaces were excavated. The pits contained much artifactual material,

and it is hoped that as a result of laboratory study some chronology may be recognized. No houses were present in the area excavated, although a diligent search for structures was made. The site has many different cultural elements. The pottery is predominantly Late Woodland but Blue Island, Fisher, and western Iroquois-like sherds were present. This major occupation is late prehistoric and may represent the Miami occupation of the late seveteenth century.

A Hopewell site is adjacent to the section excavated but testing in the area did not reveal any cultural features, although Hopewell sherds and stone and flint artifacts can be picked up on the surface. A burial mound excavated by John Birdsell belonged to this period.

Birdsell had also recovered three fluted blade fragments from this site. During a two weeks survey of collections and sites in southwestern Michigan, it became evident that a score or so fluted blades had been left in the area. A number of Pinto Basin points were also photographed. Several of these sites were clearly non-pottery.

"During July and August work on the three sites at Killarney, Ontario, was continued by six students under the direction of E. F. Greenman. Excavation was confined chiefly to the intermediate site (CHl), which lies at an elevation of 56 feet above the modern Lake Huron. A new trench here elaborated the lower component to the extent of four more artifacts. These materials lie at a depth of two to four feet on the site, in water-laid gravels, and some of the implement types suggest rather strongly an evolution from those of George Lake 1. Work on the latter site was limited chiefly to continuation of contour-mapping, a slow undertaking because of thick underbrush. Each season at Killarney exploratory trips are made in the effort to find other sites. This summer a week's canoe-trip 30 miles east by two members of the party, along a chain of inland lakes, resulted in the finding of one quartzite flake with all the ear-marks of a human origin, on an abandoned beach somewhere between 100 and 200 feet elevation. Two Canadian provincial police, curious about fishing licenses, were also discovered at the same time without, however, damage to the budget. Some amount of time was taken up during the summer by the installation of a well and pump, and building a house over the equipment. Everyone in Killarney either fishes, guides, or farms, and we have to do our own construction work.

"On the lower site, Killarney Bay 1, a trench aimed specifically at the water-laid (or lower) component, just didn't yield this summer. On another part of the site 5 feet of a small mound, already dug out at the center, were taken off without more than stratigraphical results. This site, as has been indicated in previous reports, originally had three burial mounds. All three were taken care of, so to speak, about forty years ago." (*R.G.M.* and *J.B.G.*)

SOUTHEAST

From Dr. A. R. Kelly comes a report that the University of Georgia survey of the lower Flint and Cattahoochee rivers, Jim Woodruff Dam, closed the current season with the excavation of a Weeden Island-type burial mound near Bainbridge, Georgia. Despite unqualified digging over a period of fifty years, the mound yielded some twenty-two undisturbed burials and sufficient archaeological material for purposes of cultural analysis. This will permit a significant study of Weeden Island extensions into this part of southwestern Georgia, where twenty-five other villages and camp site areas were surveyed, yielding pottery and other artifacts.

During the summer, the Department of Anthropology and Archaeology collaborated with the Department of State Parks of Georgia in conducting a survey of Kolomoki Mounds State Park, Blakely, Georgia along a one-mile strip where a proposed roadway will be constructed. William H. Sears, formerly of the University of Chicago and the University of Michigan, was archaeologist-in-charge. Test excavations yielded some 17,000 sherds and other artifacts indicating at least three major occupations of this huge metropolitan area with Late Swift Creek, Weeden Island, and an aberrant Lamar represented. Sears' report on the season's work will be completed within the coming year.

Another project of the Georgia Department was the survey of the Oconee River basin above the Furman Shoals Dam, about six miles west of Milledgeville, Georgia. The project was made possible by a donation from the Georgia Power Company and is one of the few instances in which a private corporation has subsidized archaeological survey and salvage work incident to the construction of power dams. The survey revealed some 42 sites and the cultural materials collected make possible an analysis of site data from this significant territory of the Oconee drainage. Fortunately, the major Oconee River sites near Milledgeville will not be affected by this development. These include the Shinholser mounds and the presumed site of Old Oconee Town. The most important site in the dam basin, which covers portions of Baldwin, Putnam, and Hancock counties, is the second Stone Eagle Effigy Mound, described by C. C. Jones in his *Antiquities of the Southern Indians*, which has been donated to the University of Georgia.

Considerable concern is felt over the impending coverage of important sites in the Allatoona Basin, where the Smithsonian Institution made a preliminary survey last year. Rapid completion of the key dam at Allatoona threatens inundation of many important sites in this strategic territory within another year. Negotiations are in progress whereby the University of Georgia will assist as much as possible in this emergency to save site data in the crucial area. Failure of Congress to appropriate funds for salvage operations in the Allatoona basin is a factor.

Of interest are the results of some tests made by T. M. N. Lewis at the University of Tennessee with various types of atlatls and darts modeled after preserved museum specimens of Malcolm W. Hill of Alexandria, Virginia. Tests with light stone weights immediately above the handle of the atlatl seemed neither to aid nor retard the effectiveness of the throw. No attempt was made to use weights exceeding two or three ounces, but it seemed clear that the weight offered no obvious advantage. Lewis believes these tests indicate that only the lighter examples of bannerstones were ever used with the atlatl and then only as a decoration or fetish.

Activities of the Middle American Research Institute are

reported by Robert Wauchope, Director. Arden R. King, Associate in Anthropology, has completed his study of the geographical and chronological distribution of tripod pottery in the Central Andean region and prepared an article for AMERICAN ANTIQUITY on this subject.[1] Also, he has continued work on his analysis of a collection of pottery, netting, textiles, and bark cloth from caves near Cintalapa, Chiapas, Mexico, the results to be published in the Middle American Research Institute's *Records* series. King has brought near completion a report on archaeological excavations at the Cattle Point Site, San Juan Island, Washington.

William Griffith, Associate in History at the Institute, was engaged in a search of early documents relating to the Hasinai Indians of southeast Texas, a study in line with his broader program of research in the marginal aspects of Middle American history and human relations. The Institute, in cooperation with the Tulane University Committee on Latin American Studies, will bring to the University in 1948–49 a graduate assistant to work under Griffith's direction in analyzing certain manuscript collections in the Institute Library.

John Biesanz, Associate in Sociology, and Mrs. Biesanz spent the summer in Panama and the Canal Zone, gathering material for a book on that area. Wauchope and King delivered a series of ten seminar lectures on the psychiatric aspects of anthropology to the Psychiatric Staff at the Veteran's Hospital in Gulfport, Mississippi. Mrs. Marie Hunter Irvine, Institute librarian, has completed an analysis of the contents of the Viceregal and Ecclesiastical Mexican Documents Collection. This study will appear in the Institute's *Miscellaneous Series*.

William Hunter, whose studies in Nahuatl languages at the University of Mexico were supported financially by the Middle American Research Institute, has returned to Tulane to continue advanced work in languages and to begin research on the Institute's manuscript collection. Victor Yavetz, who has also studied languages in Mexico, has come to Tulane in a similar capacity. For the second term of 1948–49 it is expected that a distinguished Mexican authority on Indian languages will be at Tulane as a visiting professor.

Several manuscripts to be published by the Institute are now in press. During the summer "Surface Collection at Chiche, Guatemala" by Robert Wauchope was issued in the *Records* series. A new addition to the Tulane faculty this year is K. H. Silvert in Latin American Political Science. This appointment strengthens the University's program of Latin American Studies in anthropology, sociology, history, economics, international relations, languages, and political science. Tulane now offers an undergraduate major in anthropology, to which there has been a gratifying student response. This year the University begins also an undergraduate and M.A. concentration in Latin American Studies, the former as a "coordinate major" taken in conjunction with a major in some other department.

At the University of Kentucky, Charles E. Snow has completed the study of the skeletal material collected by Brew at Awatovi. His "The Indian Knoll Skeletons" is in page proof and will appear shortly as a bulletin of the *Reports in Anthropology*. W. G. Haag was on leave during the summer teaching at the University of Indiana. Frank J. Essene taught sessions at Minnesota and Washington University, St. Louis.

The survey of the Dewey Dam reservoir in Floyd and Pike counties, eastern Kentucky was completed in early June. Only one good site was found in this narrow valley although it is believed that many others are there, but hidden by the silting apparent in every bend of the small stream being dammed. Excavations were begun in middle June in the Wolf Creek reservoir under the direction of W. S. Webb with Richard S. MacNeish in charge of the field work. With nine students, MacNeish excavated one Mississippi village literally just ahead of the earth excavators digging for fill material for the dam. Another site was extensively trenched revealing fabric-impressed grit-tempered sherds (un-Baumerish) and other indications of an Early Woodland manifestation. Most of the summer was spent on a site which has yielded a town-house structure of the "Small Log" variety covered by a mound upon which were four more rectangular structures. The old humus zone beneath all has fully-flexed burials, cremations with steatite vessels, large circular fire basins, and grit-tempered cord-wrapped paddle sherds. One of the fully-flexed burials had four small triangular points in the body area, two of which were imbedded in bones. Because of the importance of this site, Haag is continuing the excavations through the fall. Impounding of the water for this dam is scheduled for next summer and the wealth of sites being lost to study is hardly compensated for in the thorough study of one site.

During the summer months of 1948 the Alabama Museum of Natural History conducted archaeological excavations at what has been called the site of "Coosa" on the Coosa River near Childersburg, Alabama. David L. DeJarnette and Steve B. Wimberly of the Museum staff were in charge of the excavations. Lewis H. Larson, Jr., University of Minnesota student, was attached to the field party as Archaeological Aide.

Coosa, a town of the Upper Creek Indians, was a flourishing community at the time of Hernando de Soto's visit there in 1540. Tristan de Luna's men visited the town in 1560. A soldier under Juan Pardo visited Coosa in 1567. English traders found the city still intact in the seventeenth century. Until late in the eighteenth century the French and English took census at Coosa.

For some time it has been assumed that the Coosa of De Soto's time was located between Talladega and Tallasahatchee creeks on the Coosa River, and a knoll near Talladega Creek has been considered the most likely spot. Excavations conducted this summer on that knoll, however, revealed no evidence of a town contemporary with De Soto. Other sites between Talladega and Tallasahatchee creeks have been considered less likely the Coosa of De Soto's day, but the Alabama Museum expects to determine their status by excavation in the near future.

Preliminary laboratory studies of material excavated this summer reveal that nearly every object of aboriginal manu-

[1] Published in the last issue, Vol. 14, No. 2, pp 103–16. *Editor.*

facture is in clear-cut association with products of Caucasian manufacture which date generally after 1750. The evidence seems to be that, although the Coosa Indians may have occupied the village area under examination, they were not there as early as 1540.

During excavation large midden pits, smaller corn-filled pits, scattered post holes, and twelve burials were found. Typical burial associations were glass beads, brass buttons, bells and wristlets, flintlock muskets, gun flints, musket balls, iron nails, knives and axes, white clay trade pipes. Midden pits and a shallow midden contained similar material together with animal bones and pottery sherds. The pottery assemblage from this site is similar to the Ocmulgee Fields pottery series.

Mr. George I. Quimby of the Chicago Natural History Museum completed the writing of a report on the excavation of the Medora site in West Baton Rouge Parish, Louisiana, and began writing a report on the excavation of the Bayou Goula site in Iberville Parish, Louisiana. The Medora site represented at Plaquemine period occupancy and the Bayou Goula site contained an historic occupany overlying Plaquemine period materials. The historic occupancy of Bayogoula, Quinipissa, Taensa, Tiou, Acolapissa, and Houma peoples at the Bayou Goula site was manifested by a Natchezan type of archaeological culture. Mr. Quimby also completed a short paper on "Prehistoric Art in the Aleutian Islands" in which he outlined tentatively the designs and design elements characteristic of three periods of Aleut culture.

Survey work under the direction of Joffre Coe of the University of North Carolina, with Paul Streiff of the University of Michigan as a member of the party, provided important information on the early cultures of the central part of the state. At one site in Montgomery County, near Badin, a test pit 11 feet deep yielded stratigraphy with the bottom level points "identical with the Pinto Basin and the Gypsum Cave types." They are older than a complex which resembles Stallings Island. The latter is, in turn, overlaid by a zone with a transition from pre-pottery to early Woodland types. Two other sites also produced evidence of a gradual change from late Archaic into the Early Woodland. (*W.G.H.*)

NORTHEAST

During the summer of 1948, a number of institutions in the Northeastern area conducted archaeological field research in the territory ranging from lower Canada to the Delmarva Peninsula, chiefly on sites and problems of previous concern.

In Maine, according to Douglas S. Byers and Wendell S. Hadlock, "a joint expedition sponsored by the Robert S. Peabody Foundation and the Robert Abbe Museum, in cooperation with the University of Pennsylvania Summer School, continued excavations at Wasp Island in the Union River, Ellsworth Falls, Maine.

"Further evidence was secured regarding the sequence of types. Stratification, which was also observed last year, provided good evidence that the site had first been occupied by people using polished stone tools, including slate spears, adzes, and gouges, as well as certain chipped forms that appear to be characterized by percussion flaking. These were succeeded by people who did not use polished stone for projectile points, and who made some pottery and chipped implements, of which at least some show evidence of pressure flaking and retouching. The topmost level includes chipped implements, with thumbnail scrapers in great numbers, a few polished implements, and pottery with various forms of impressed decorations. The material is not yet fully analyzed. It is expected that analysis will be carried out during the coming winter.

"The party included not only Wendell S. Hadlock and Douglas S. Byers, of the sponsoring institutions, but also Mrs. C. D. Blaker, Washington, D. C., as well as a group of students from the University of Pennsylvania Summer School, under the direction of Dr. Theodore Stern, and comprising: A. Frances Eyman, Barbara Feller, Helen V. Fisher, Alta Mae Harris, H. B. McGarry, James Van Stone, Harry Waitzman, and H. B. Willcox. Dr. and Mrs. Stern were in charge of the summer camp, at which all students stayed. Mr. Stephen Phillips of Salem, Mass., was of great assistance during a period of a month when he worked at the site as a volunteer. Miss Ann K. Stimson prepared diagrams for all the cross sections.

"Dr. Isaac W. Kingsbury of Perry, Maine has been working on a site in Eastport, Maine where he has reported a small occupation area of one horizon from which there has been taken artifacts similar to those reported from the earliest levels of previously excavated sites. No pottery has at this date been found."

"At the time of going to press no information has been received from the Andover-Harvard Yukon Expedition, nor from Edward and Murray Rogers who have been conducting an archaeological survey of interior Quebec."

For Massachusetts, Maurice Robbins of the Massachusetts Archaeological Society, reports as follows: "During the season of 1948 the Warren King Moorehead Chapter of the Massachusetts Archaeological Society has continued its excavation at the Titicut site in Bridgewater, Massachusetts. This site has been found to contain elements of prehistoric as well as historic cultures. Of particular interest this year are two types of copper or brass projectile points, the usual cut-out triangle and a conical rolled type. Work on this site is now practically completed and it is hoped to publish a report in the near future."

For Connecticut, Irving Rouse reports: "Excavation of the Grannis Island shell heap in New Haven harbor was continued over the summer by the local chapter of the Archaeological Society of Connecticut under the direction of Howard R. Sargent, a student at Yale University. The site seems to have been used as a summer camp, since it is situated in the salt marshes of the Quinnipiac River, completely unprotected from winter winds. The finding this summer of fragments of clay trade pipes in the upper part of the deposit places the end of occupation in the eighteenth century. Habitation apparently began much earlier, however, as part of the deposit underlies the surrounding marsh.

"G. D. Pope, Jr., a graduate student at Yale, excavated at the Eddy Pray site near East Killingly in an attempt to test suggestions that it is early[4] and contains material

[4] Douglas S. Byers, this journal, Vol. 1, No. 4, p. 326.

comparable to Greenman's George Lake culture.[5] When it was found that previous excavations had cleaned out the major part of the site, work was shifted to a neighboring site at Moosup Pond, where the types of implements resembling the George Lake material were also found in association with more advanced forms typical of Connecticut archaeology. The work is as yet inconclusive, but it does not seem to favor correlation of the George Lake and Connecticut material.

"Excavations were also undertaken at the Ragged Mountain rock shelter near Barkhamsted, Connecticut by William S. Fowler, Curator of the Attleboro Museum; Richard N. Adams, a graduate student at Yale; and the writer. This is a combined steatite quarry and camp site. Two layers were found in the habitation refuse, the lower apparently preceramic and the upper representing a late ceramic period. The lower stratum, with which the steatite quarry can be correlated, appears to have some resemblance to Laurentian, although determination of the exact relationship, if any, must await detailed study of the material."

The Rochester Museum of Arts and Sciences, aided by a grant from the American Philosophical Society, and with the kind consent of the National Museum of Canada and the Royal Ontario Museum, pursued investigations for nine weeks in the Bay of Quinte, Trent Waterway, and Rice Lake regions. A party comprising Peter P. Pratt and Gordon K. Wright, aided for a time by Charles F. Wray and Dr. Vernon Leslie, under the active direction of Dr. William A. Ritchie, began reconnaissance on the Bay of Quinte late in June. The chief work done here was on a number of annular earth and stone mounds, similar to those known from Jefferson County, N. Y., and on a burial site of unusual interest.

As in New York State, the mounds contained little to identify them either culturally or functionally. Associated with the one evidently intrusive burial were a few impression decorated potsherds of a kind found in certain Pt. Peninsula sites in New York and subsequently discovered at Rice Lake.

The burial site, located near Picton, produced eleven graves containing cremated, bundle, and flexed inhumations, all interred in copious masses of powdered hematite and a bright green clay. Marine shell beads, pendants, and gorgets of sundry types; native copper beads of several sorts, with heavy adzes of the same material; and a single lump of galena comprised the burial accompaniments. Nearly every grave held mortuary offerings of shell or copper or both. The total complex strikingly resembles that characterizing the so-called Glacial Kame culture of Michigan and Ohio, but some links with the Pt. Peninsula culture also occur.

On the Trent River excavations were made in groundslate producing camp sites, one of which seemed to represent the basic Laurentian horizon, to which early Middle Woodland types of pottery were superadded, as shown on other components. I suspect that this level depicts the initial introduction of ceramics into Ontario from a source farther west and that diffusion subsequently carried this ware (Vinette 2) into the Maritimes, Upper New England, and Northern and Central New York.

At Rice Lake one very productive stratified site yielded a typological ceramic progression beginning on this early level and closely paralleling the series found by us at Brewerton and Jack's Reef in central New York State. Iroquois (Huron?) sherds occurred in the sod and upper loam layers. Excavations begun on another promising site of this character were terminated for want of time.

The data, now in process of analysis, promise much information pertinent to cultural change and continuity in an area which has definitely been shown to embrace both lower Ontario and much of New York State, with the latter evidently peripheral to the former.

For the Pennsylvania Historical Commission John Witthoft excavated two mixed culture sites in Bradford Co. with results which will doubtless help to clarify the prehistoric picture in the upper Susquehanna Valley. In cache pits on a delta area near Wysox he uncovered typical Castle Creek material and burials in 16 pits, while 6 other pits yielded historic Andaste remains. Since these are the first cache pits known to him from this region he concludes that "apparently we have something like the Iroquois settlement pattern for Owasco here with flood plain village sites paired with cache areas on high ground. I think this explains the isolated cemeteries so frequently reported in the upper Susquehanna Valley."

The remainder of the two months' season was spent in excavating a small village site at South Towanda. "This was a flood plain village site which was selected for excavation because several components were present, and we hoped to get some information on their chronological relationship. Clemson's Island (the earliest) and Andaste (the latest) components were barely represented, while Canandaigua, Early Castle Creek, Bainbridge-like, and an evolved Richmond Mills horizon were strongly in evidence. Only three types of pits were noted. The majority of them were shallow saucer-shaped pits very symmetrically made, and showing no trace of firing. Some of these had secondary pits dug from their bottoms and a shallow cave dug out on all sides into the subsoil. Every secondary pit of this type contained a burial. Large conical-shaped pits were infrequent, and several of them which contained no artifact material had their origin as much as 4 feet below the present land surface. A Middle Woodland complex with side-notched projectile points and pottery like Geneseo Cord-marked was found in a buried topsoil layer beneath a foot of sterile subsoil."

In the Delmarva Peninsula "a University of Pennsylvania expedition, operating under a grant from the Indiana Historical Society, continued its research in Lenape prehistory," according to Edmund S. Carpenter. "Near Lewes, Delaware, a party under the supervision of Drs. Frank G. Speck and J. Alden Mason, comprising Henry N. Michael, Martin Berdit, Jacob Gruber, Vernon N. Leslie, and Edmund S. Carpenter, who was in charge, cooperated with the Sussex County. Archaeological Society of Delaware in the excavation of a remarkably rich and instructive village site. Previous explorations here by Messrs. H. Geiger Omwake and Kenneth Givan of Lewes had disclosed what is without cavil one of the largest and most important stations on the

[5] James B. Griffin, "Cultural Change and Continuity in Eastern United States Archaeology," *Papers of the R. S., Peabody Foundation for Archaeology, Vol. 3, Andover, 1946, p. 42.* (See also p. 250 above. *Editor.*)

Delmarva Peninsula. The skeletal remains are being studied by Dr. T. Dale Stewart of the U. S. National Museum."

Additional excavations made by the party included the exploration of both an historic Iroquois cemetery and a Munsee village site.

The Delaware Research Project, sponsored by the Indiana Historical Society, and carried on by Dr. Katherine McCann under the supervision of Dr. Dorothy Cross of the New Jersey State Museum, was again concentrated in southern New Jersey. "Three contact sites were excavated, two on the north side of Oldman's Creek on the Semenuk and Magueri farms and one on the south side of Salem Creek on the Krol farm. Three more sites in the vicinity will be tested this fall as soon as crops are harvested.

"For the State Museum Dr. Cross excavated an interesting group burial at Gilford Park, Ocean County, New Jersey, last August. It consisted of seven flexed skeletons, two adults and five children, accompanied by pendants and amulets, placed in a refuse pit." (*W.A.R.*)

MIDDLE AMERICA

Yarumela, in the Comayagua Valley of Honduras, C. A., was systematically excavated for the first time. The work was carried on from March until June, 1948, under the auspices of the Peabody Museum of Harvard University with Joel S. Canby as field director. The extensive mound-site has been known in a general way to Middle American archaeologists since the time of Squier.[4] From the information he presented and from later brief reports which followed equally brief visits by other interested persons to the area, a rather mistaken impression of Yarumela has developed. Surface finds there have yielded some polychrome pottery belonging to the Ulua-Yojoa group which is more or less contemporary with the Full Classic of Copan, or even later. For recent attempts at correlation we may cite Strong, Kidder, and Paul,[5] and John M. Longyear.[6]

The results of widepsread test-pitting at Yarumela, however, point to a much earlier date for this site. Preliminary analysis of the material shows three clear-cut periods to have existed (based on potsherd typology). The earliest is a bichrome group which apparently existed before the introduction or development of Usulutan ware. This type of pottery probably correlates with the Lower Playa de los Muertos finds.[7] The middle ceramic class is rich in Usulutan wares and bichrome material, but lacks Ulua Polychrome. Tentatively, this would seem to be closely related to the "Uulua Bichrome" found in the lower level at Santa Rita by Strong, Kidder, and Paul.[8] The latest material found was Ulua-Yojoa Polychrome. This formed only a veneer at Yarumela, and was not closely associated with any of the numerous rubble mounds of the site. The assignment of this ware to the upper level wares found at Playa de los Muertos, Santa Rita, and Los Naranjos[9] can be made without hesitation.

No masonry or carved stone was found during the season. It seems safe to state, then, that Yarumela was occupied during the "Archaic" or "Bichrome Period." The "Polychrome Culture" was late there and had little or no effect upon the site itself. In fact, because of the paucity of multi-colored pottery from the test pits made in the central parts of the site, one might speculate that it was actually avoided by the late-comers.

The material from this dig is now being worked up by the field director and will first appear as a doctoral dissertation at Harvard University. (*G.F.E.*)

THE 1948 SOUTHWESTERN ARCHAEOLOGICAL CONFERENCE

On August 24–26 inclusive, the University of Arizona was privileged to act as host to the Southwestern Archaeological Conference at its Point of Pines Archaeological Field School. The Viking Fund, Inc., of New York generously contributed towards the expenses of the occasion. This gathering, which heretofore has met in various points in New Mexico, brought over one hundred persons to an archaeologically fertile but little known part of Arizona. Participants represented the following institutions:

San Diego Museum of Man
San Diego State College
Carnegie Institution
University of Denver
Columbia University
Colorado Museum of Natural History
Museum of New Mexico
National Park Service
Peabody Museum, Harvard University
University of California
University of Texas
Chicago Natural History Museum
Museum of Northern Arizona
Pueblo Grande Laboratory, Phoenix
University of Oklahoma
University of Arizona
Gila Pueblo, Globe, Arizona
University of Chicago
Trinity College
University of Michigan
Amerind Foundation, Dragoon, Arizona
Hungarian National Museum, Budapest
University of New Mexico

The Conference formally opened on the afternoon of August 24 with words of welcome from Mr. Clarence Wesley, Chairman of the San Carlos Apache Tribal Council; Dr. John Lasley, who spoke on behalf of the Indian Service for Supt. E. R. Stover; and Dr. Robert L. Nugent, Vice President of the University of Arizona. The election of Emil W. Haury as General Chairman for the meeting was followed by a general discussion of the agenda and the appointment of a Program Committee (J. O. Brew, Chairman, J. Charles Kelley, Paul S. Martin, Theodore D.

[4] E. G. Squier, *Notes on Central America*, New York, 1855, p. 123; *The States of Central America*, New York 1858, p. 133; and "A Visit to the Goajiquero Indians," *Harper's Magazine*, October, 1859, p. 608.

[5] Wm. Duncan Strong, A. V. Kidder, II, and A. J. D. Paul, "Preliminary Report on the Smithsonian Institution-Harvard University Archaeological Expedition to Northwestern Honduras, "*Smithsonian Miscellaneous Collections*, Vol. 97, No. 1, pp. 118–125, Washington, 1936.

[6] John M. Longyear, "Cultures and Peoples of the Southeastern Maya Frontier," *Theoretical Approach to Problems*, No. 3, Washington: Carnegie Institution, 1947, pp. 2–6, 12.

[7] Strong, Kidder, and Paul, *op. cit.*, pp. 62–75, 119–25.

[8] *Op. cit.*, pp. 45–62, 119–25.

[9] *Ibid.*, and pp. 105–15.

McCown, Erik Reed) to formulate an overall plan for the meeting.

Since the present gathering marked the twenty-first anniversary of the first Pecos Conference in 1927, its originator, Dr. A. V. Kidder, was prevailed upon to sketch the course of the meetings in the process of "coming of age." The first Pecos Conference, attended by thirty-nine people, is best known for its formulation of the Pecos Classification of Southwestern prehistory. This classification came as a suggestion from the late T. T. Waterman, a fact which appears not to be generally known. Dr. Kidder, however, accepted the responsibility for introducing the term Basketmaker I which now, twenty-one years later, still only meets a theoretical requirement of the time scale.

The second Conference was held again at Pecos in 1929 and concerned itself primarily with pottery types and problems of nomenclature. In 1930 a smaller conference was held at Gila Pueblo, Globe, Arizona, which occupied itself with further refinements in nomenclature and the problem of setting up ceramic types.

The fourth Conference, in 1931, was held at the Laboratory of Anthropology, Sante Fe. There then followed a number of years during which time no meetings were called. The University of New Mexico revived the sessions by calling the first Chaco Canyon Conference in 1938, which then continued as an annual event until the outbreak of World War II. The sessions were reopened in 1946 at the Laboratory of Anthropology, Santa Fe, followed by the fifth Chaco Canyon Conference in July, 1947.

The remaining time of the first session and the morning of August 25 was devoted to the customary news round-up of current research projects. The following reported:

H. S. Colton and Watson Smith, Museum of Northern Arizona: Studies in the Flagstaff area bearing on the inter-relationship of Anasazi, Sinagua, and Cohonina.

Paul S. Martin, Chicago Natural History Museum: Early Man and Mogollon studies near Pine Lawn, New Mexico.

J. Charles Kelley, University of Texas: Reconnaissance on the Rio Grande.

Herbert Taylor, University of Texas: Studies in the region west of the Pecos River.

Deric O'Bryan, Gila Pueblo: Work in west-central New Mexico and in the Mesa Verde National Park.

Clyde Kluckhohn, Harvard University: The Ramah Project.

Theodore D. McCown, University of California: The archaeological program of the University of California.

J. O. Brew, Harvard University: River Valley Project.

Stanley Stubbs, Museum of New Mexico: Archaeological work near Albuquerque by the University of New Mexico Field School.

Bertha P. Dutton, Museum of New Mexico: Results of the National Girl Scout Program of 1947.

Marie Wormington, Colorado Museum of Natural History: Final results of the work in the Turner Site.

A. V. Kidder and Earl H. Morris, Carnegie Institution: Status of Basketmaker sandal studies.

James B. Schaeffer, Kinishba Museum, Fort Apache, Arizona: New data on the plaza at Kinishba indicating it to have been a late Great Kiva.

William Pearce, Texas Technological College: Current studies in a Pueblo IV site near Glorieta, New Mexico.

In the evening Dr. Kidder presented an illustrated lecture on the Bonampak murals.

On Wednesday morning, August 25, the progress reports continued with J. O. Brew as Chairman. The following participated:

Arnold M. Withers, University of Denver: Reconnaissance between Glenwood Springs and Denver and between Pueblo and Walsenburg, as a part of the River Basin Survey program.

Malcolm F. Farmer, San Diego Museum of Man: Rehabilitation of the Museum and a projected re-analysis of early California lithic complexes.

Odd S. Halseth, Pueblo Grande Laboratory, Phoenix: Recording of Pima and Papago songs.

Jesse L. Nusbaum and Erik Reed, National Park Service: Government permits for archaeological work in National Monuments and National Park areas.

Albert Schroeder, National Park Service: Further evidences of ball courts in the Verde Valley, Arizona.

J. O. Brew, E. B. Danson, and Herbert Dick, Harvard University: Progress of the Upper Gila Expedition of the Peabody Museum, "Pueblo" and "Early Man" Divisions, covering reconnaissance and excavation in Bat Cave.

Ernst Antevs, Globe, Arizona: Geological aspects of Bat Cave.

Frederico S. Vidal, Harvard University: Studies of Indian Service Administration.

Karl Schmitt, University of Oklahoma: River Valley Survey in Oklahoma and test excavations at Fort Gibson.

Alex Krieger, University of Texas: Current work at the Battle Mound, Southwestern Arkansas.

Alfred E. Dittert and Reynold Rupee, University of New Mexico: Reconnaissance in the northeastern Mogollon periphery.

W. W. Hill, University of New Mexico: Report on the activities of the Department of Anthropology.

Ernest Hill, University of New Mexico: Ethnological work among the Utes of northern Utah.

Donald J. Lehmer, University of Chicago: Projected work of the Institute of North Mexican Studies.

Edmund Schulman, Tree-Ring Laboratory, University of Arizona: Recent tree-ring developments.

Emil W. Haury, University of Arizona: The Point of Pines project.

At 2:00 P.M. on August 25 the meeting took up pre-pottery and non-pottery cultures with Theodore D. McCown as Chairman. A discussion of projectile point terminology resulted in conference action approving the abandonment of the term "Yuma" in a specific sense in favor of a binomial system for the designation of specific forms as "Eden Yuma." There was a consideration of the problem of underlying connections between Texas and the Southwest on preceramic levels. Earl H. Morris gave a report on Basketmaker II in the Durango area. Other problems discussed included the status of Basketmaker I and the probability of the Cochise pattern underlying and contributing to the later Anasazi, Mogollon, and Hohokam developments.

At 8:00 P.M. on August 25 was held a preliminary organizational meeting of those interested in forming a Western States Branch, American Anthropological Association, with Malcolm F. Farmer acting as temporary chairman. The participants in the meeting agreed that a Western States Branch should be formed, whereupon Malcolm F. Farmer was elected Temporary Chairman and empowered to appoint an organizational committee. It was voted that the first meeting should be held at Salt Lake City, University of Utah, in the fall of 1948. The Organization Committee consists of the following persons:

Malcolm F. Farmer, Chairman
Theodore D. McCowan
Viola Garfield
F. H. Douglas

On Thursday, August 26 at 9:00 A.M. there was a panel discussion on the Mogollon culture, with Paul S. Martin and E. B. Sayles as Co-Chairmen. This discussion, lively and informative at times, obtuse at other times, did at least

bring certain problems into the open and showed the great need for a more energetic wielding of the shovel.

On Thursday, August 26 at 2:00 P.M. the topic was Transition to History, with E. H. Spicer, Chairman. Attention was focused on the following:

Archaeological inferences from ethnological data
Ethnological identity of archaeological complexes
Non-Pueblo peoples
Acculturation

Before adjourning the General Chairman appointed an Interim Committee consisting of H. S. Colton, Chairman, Stanley Stubbs, and Paul S. Martin, whose responsibility it will be to determine the time and place of the next meeting. (*Emil W. Haury.*)

UNIVERSITY OF MICHIGAN

The University of Michigan has inaugurated a doctoral program in anthropology. The staff of the Department consists of Leslie A. White, Professor and Chairman; Mischa Titiev, James B. Griffin, Emerson F. Greenman, Horace M. Miner, and Kenneth L. Pike, Associate Professors; Volney H. Jones and Albert C. Spaulding, Assistant Professors; and Richard K. Beardsley, Instructor. Griffin, Greenman, Jones, and Spaulding are not, however, full-time members of the teaching staff since they serve also as director and curators of the Museum of Anthropology. Miner is primarily in the Department of Sociology but has an appointment and offers courses in the Department of Anthropology as well. For the present, Pike is spending only one semester a year, the spring term, on campus. In addition to courses of a general nature, the curriculum in anthropology emphasizes work in the archaeology and ethnology of the Americas and the Far East, in ethnobotany, and in ethnological theory. The collections in the various divisions of the Museum of Anthropology, the resources of the Ceramic Repository, and the Laboratory of Ethnobotany provide facilities for both teaching and research. Two teaching fellowships in the Department and three research assistantships in the Museum are open to qualified graduate students annually. (*L. A. White.*)

COMMITTEE ON THE INTERRELATIONS OF PLEISTOCENE RESEARCH

Of particular interest to anthropologists is a new committee established in June, 1947 by the Division of Geology and Geography of the National Research Council. The new committee is entitled the Committee on the Interrelations of Pleistocene Research. Because of growing world-wide interest in the Pleistocene epoch and because of the diverse approaches to the subject made by workers in different fields of research, the members of the Committee have been drawn from several sciences. It is the intention of the Committee to provide for the exchange of information between workers in these disciplines, to review periodically the status of research upon the Pleistocene, and to encourage the investigation of problems whose solution is often dependent upon contacts between specialists in more than one field. The Committee members at present include the following: Henri Bader, glaciology (Department of Geology, Rutgers University); Edward S. Deevey, Jr., biogeography (Department of Biology, Yale University); Loren C. Eiseley, anthropology and New World archaeology (Department of Anthropology, University of Pennsylvania); Richard Foster Flint, chairman of the Committee (Department of Geology, Yale University); Claude W. Hibbard, vertebrate paleontology (Museum of Paleontology, University of Michigan); Chauncey D. Holmes, glacial erosion and sedimentation (Department of Geology, University of Missouri); Helmut E. Landsberg, meteorology and climatology (Committee on Geophysical Sciences, Research and Development Board, Washington, D.C.); Hallam L. Movius, Jr., Old World archaeology (Peabody Museum of Archaeology and Ethnology, Harvard University); Fred B. Phleger, Jr., oceanography and sea-floor geology (Department of Geology, Amherst College); Louis L. Ray, glacial stratigraphy, alpine glacial geology (United States Geological Survey, Washington, D.C.); H. T. U. Smith, eolian features, frost phenomena, and steam terraces (Geology Department, University of Kansas); James Thorp, soil science (Division of Soil Survey, United States Department of Agriculture, Lincoln, Nebraska).

The Committee is open to constructive suggestions from all those interested in research in this field and will welcome information regarding research on the Pleistocene from all interested workers. Communications regarding special fields should be addressed to individual members. Those of a more general nature can be sent to the chairman, Professor Flint. From the standpoint of anthropology, it should be noted that the Committee offers the possibilities of more extended cooperation and advice upon the multitude of problems which often confront the archaeologist when he is concerned with the dating of early human horizons. (*Loren C. Eiseley.*)

ANNUAL MEETING

May 13–14, 1949 has been officially set as the date for the 1949 annual meeting of the Society for American Archaeology, which is to be held jointly with that of the Central States Branch of the American Anthropological Association. The meeting will take place on the campus of Indiana University at Bloomington, Indiana. Erminie W. Voegelin, chairman of the local arrangements committee, announces that rooms will be available in the Union Building and the Union Club on campus; room reservations blanks will be sent to the members of the Society early in April.

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